Lexical properties of English verbs

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ABSTRACT

The central claim of this thesis is that the combinatorial properties of words are determined by their lexical structures. I argue that the lexicalist position follows from the Word Grammar (WG) analytical framework. This framework, developed by Hudson (1984, 1990, 1994, 2003), is the one that I adopt in the linguistic descriptions in the thesis, and the further development of the framework is a significant part of the work.

I consider the work of a number of writers, some of whom take a similar lexicalist position. I show how the lexicalist assumption, together with the analytical properties of WG, provides for a meaningful and explanatory analysis of a number of grammatical patterns, including the interaction between verbs of motion and their satellites, the syntactic and semantic behaviour of resultative expressions and alternation between causative and unaccusative uses of verbs. A detailed analysis of the meanings of verbs and prepositions provides the means for predicting their syntactic and semantic behaviour in the relevant constructions.

I concentrate on English chiefly because it is my own first language, but also because of the body of existing work, including corpuses, in or on English which provides a basis for the work in the second part. I do consider data from other languages when they show illuminating similarities or differences to the patterns found in English.

I concentrate on the structure and behaviour of verbs since they often stand at the centre of grammatical structures, determining to a large extent the relationships among the elements that surround them. However, it is of course impossible to study the behaviour of verbs without also considering the properties of those other elements. Considerable time is spent on the relationships between verbs and other argument-taking words, including prepositions, particles and adjectives.

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1. Lexical properties of English verbs

In this, introductory, chapter I introduce the central claim of the thesis: that the combinatorial (syntactic) properties of words are determined in part by their meanings, and cannot be explained without a detailed analysis of their lexical semantic structure, and discuss some reasons for making this assumption in analysing linguistic structures.

I go on, in 1.1.2, to consider the work of some other researchers into the relationship between syntactic and semantic structures and I identify two complementary sets of approaches: those where (observable) syntactic behaviour is used to probe for properties of lexical (semantic) structure; and those where the semantic structures of words are applied in the construction of a generative grammar (a fuller survey of work in lexical semantics is found in the following chapter). At the end of the section I present a list of requirements on a properly developed theory of lexical structure.

The rest of the chapter consists of an introduction to **Word Grammar** (WG), the framework that I use in the linguistic descriptions I offer. I position WG with respect to three broad schools of thought in linguistics: **Dependency Grammar**, **Cognitive Linguistics** and **Construction Grammar**. I also outline the conceptual network that represents knowledge of language in WG and show this network in detail in the lexical structures of words, word meanings and grammatical relations. The WG framework described is an approach to linguistic analysis whereby the grammatical structure of sentences is expressed in terms of the lexical requirements of the grammatical categories involved, categories ranging from the highly specific (individual lexemes) to the highly general (word classes, properties common to all words).

In 1.2.4 I begin a treatment in this framework (concluded in the other chapters, chiefly chapter 3) of the way in which these lexical structures combine in compositional structures. I also offer partially developed accounts (again, the details are developed more fully in the following chapters) of the subject and object relationships and their linking properties. By way of demonstration, I finish the chapter with a detailed treatment of some examples from Levin (1993).

1.1 Motivation and structure of the thesis

1.1.1 Lexical properties of English verbs: lexicalism; Word Grammar

The central claim of this thesis is that the combinatorial (syntactic) properties of words are determined by their lexical structures. This view is by no means uncontroversial, though it is expressed in Chomsky's projection principle:

> "Representations at each syntactic level (LF, and D- and S-structure) are projected from the lexicon, in that they observe the subcategorisation properties of lexical items." (1981: 29, see also Chomsky 1986).

In the following section (1.2), I make it clear that the lexicalist position follows naturally (though not obligatorily) from the Word Grammar (WG) analytical framework. This framework, developed by Hudson (1984, 1990, 1994, 2003), is the one that I adopt in the linguistic descriptions in the final three chapters, and the further development of the framework is a significant part of the present work.

In the following chapter (2), I consider the work of a number of writers, some of whom take a similar lexicalist position, (including Croft (1998a, 2001), Cruse (1986), Faber and Uson (1999), Fillmore (1982), Geeraerts (1994), Goldberg (1995, 1998, 2002), Jackendoff (1987, 1990, 1991), Lakoff (1987), Langacker (1987), Lemmens (1998), Levin (1993), Perlmutter (1978), Pustejovsky (1991), Rappaport and Levin (1988), Wierzbicka (1972, 1966, 1998)).

In the remaining chapters I show how the lexicalist assumption, together with the analytical properties of WG, provides for a meaningful and explanatory analysis of a number of different grammatical patterns, including the interaction between verbs of motion and their satellites, the syntactic and semantic behaviour of resultative expressions and alternation between causative and unaccusative uses of verbs. A detailed analysis of the meanings of verbs and prepositions provides the means for predicting their syntactic and semantic behaviour in the relevant constructions.

I concentrate on English chiefly because it is my own first language, but also because of the body of existing work, including corpuses, in or on English which provides a basis for the work in the second part (for example I use both Levin (1993) and the ICAME collection of corpuses extensively as reference works). It should be noted that, while the general organisational principles I use should be common to all languages, the details (specific grammatical categories, relationships and

generalisations over them) need not be. I do not assume a specialised genetic basis for language, so the grammar I describe in the second part makes no claim of universality. Even basic syntactic categories like subject and object may be inappropriate for some languages.

This non-universalist position follows partly from the assumption that linguistic structures can be fully derived from lexical structures: the most immediately observable differences between different languages are lexical. We do not expect words to have the same range of meanings or pronunciations in different languages, so we should not expect them necessarily to have the same syntactic or other grammatical properties.

I do consider data from other languages, notably Dutch and German, which are of course similar to English, and with which I have some familiarity. Data are introduced from these and other languages when they show illuminating similarities or differences to the patterns found in English.

I concentrate on the structure and behaviour of verbs since they often stand at the centre of grammatical structures, determining to a large extent the relationships among the elements that surround them. However, it is of course impossible to study the behaviour of verbs without also considering the properties of those other elements. Some time is spent below on the relationships between verbs and other argument-taking words, including prepositions, particles and adjectives.

1.1.2 Lexical semantics: two approaches; a methodological problem; the requirements

Lexical semantics is discussed at length in the following chapter (2), where the work of a number of writers is explored (see the list above). While they form a rather heterogeneous set (some of the differences are considered below), these writers share the property that they see some advantage in probing the semantic properties of lexical items. This exercise may be carried out for its own sake, or because the details of the semantic structures of words are to be used to help account for their syntactic behaviour.

Levin starts with the assumption that "the behaviour of a verb, particularly with respect to the expression and interpretation of its arguments, is to a large extent

determined by its meaning", which allows verb behaviour to be used "effectively to probe for linguistically relevant pertinent aspects of verb meaning" (1993: 1). This would allow a systematic description of syntactic behaviour to be used in the construction of a principled account of lexical (semantic) structure. Other writers, however (eg Pustejovsky 1992) work in the other direction, assigning appropriate semantic structures to words in order to explain their participation in particular syntactic patterns, or other aspects of their linguistic behaviour.

Either of these approaches brings with it a special methodological problem. The first approach may lead to the (perhaps unwarranted) assumption that a given syntactic relationship or pattern always corresponds to the same semantic relationship. The converse of this problem is that semantic properties may be proposed in order to account for some syntactic regularity, that are not motivated by any other factor than the syntactic pattern they are held to explain. In this case they amount to nothing more than a "thinly disguised wild card to meet the exigencies of syntax" (Jackendoff 1987: 371).

For example, EAT, BAKE and DANCE all allow an object (1), but this should not be taken as sufficient cause to seek to identify some common semantic property. In fact, the differences in the meanings of the three examples in (1) are crucial. As (2) shows, each verb permits only two of the three kinds of object.

(1) a. Elvis ate a burger.
b. Delia baked a cake.
c. Darcy danced five yards.

(2) a. Elvis ate a burger/a hole in the table/*five yards.
b. Delia baked the batter/a cake/*five yards.
c. Darcy danced *her partner/a mazurka/five yards.

Levin and Rappaport Hovav (1995: 9) provide a further example of the dangers inherent in the linking of semantic and syntactic structures, exemplified in the treatment of the different behaviour of the two Italian verbs RUSSARE ('snore') and ARROSSIRE ('blush'). Rosen (1984) uses these verbs as evidence that syntactic structure cannot be predicted directly from verbal semantics. She argues that both verbs profile

bodily processes, yet they have different syntactic properties. RUSSARE takes the auxiliary AVERE ('have') in perfect constructions, which is taken as evidence that it is syntactically unergative, whereas ARROSSIRE takes ESSERE ('be'), which is taken as evidence that it is unaccusative. Levin and Rappaport Hovav argue that this does not count as evidence against the projection of semantic onto syntactic structure; rather, it shows that the notion 'bodily process verb' is not syntactically relevant.

Levin and Rappaport Hovav quote a number of studies which conclude that the important aspects of meaning concern the type of event profiled ('activity', 'change of state', etc), rather than the kind of argument that participates in the event ('body', 'mind', 'animal', etc) (Dowty 1991, Pinker 1989, Pustejovsky 1992, Tenny 1987, Tenny 1992, van Valin 1990). This issue is touched on at several points in what follows (1.3.4, 3.2.1, 3.3, 5.2.2, 5.3). There I show that these force-dynamic properties are very important in determining syntactic behaviour but that the other, thematic, properties are also relevant.

Above I suggested that a single syntactic pattern (the direct object relationship) is apparently related to three separate semantic patterns. There are also cases where it is doubtful that any semantic generalisations can be made over words sharing syntactic properties, for example the optionality of the object in transitive verbs. Both EAT and DEVOUR can be used with a direct object referring to the affected argument. Clearly this argument must be associated with the meanings of the verbs (since it is selected semantically: *Eat chocolate/*beer*), and the fact that arguments with similar conceptual content are linked with direct objects in so many other cases justifies the claim that these verbs can have objects because of their conceptual structures (the conceptual structures associated with the object relationship are explored below). However, EAT and DEVOUR differ, syntactically, in that the former but not the latter may also appear without its object. Can this syntactic difference also be shown to follow from properties of the conceptual structures of the two verbs, and do other optional object verbs share the relevant conceptual properties of EAT, and obligatory object verbs share those of DEVOUR?

We might be tempted somehow to mark the relevant argument positions in the conceptual structures of verbs like EAT as optional, or optionally realised in syntax, but this will remain an arbitrary stipulation, one of Jackendoff's wild cards, unless it can be

shown to follow from a particular semantic property not shared by the verbs like DEVOUR. Of course it may be that some relevant property or properties can be found, which is also shared by other optional object verbs, or it may be that the optional object verbs fall into two or more semantic classes, but whatever semantic properties define the class or classes must be independently motivated, or they remain stipulative.

However, there are cases where a lexical semantic account does appear to be well motivated. One such case is the contrast between EAT and DINE. The former, as noted, has (optionally) an object, while the latter may not have one. Hudson, Rosta, Holmes and Gisborne (1996) suggest that this pattern can be explained by appealing to the meaning of DINE, which refers to an eating event, crucially defined by the meal that is eaten (in contrast to the verbs BREAKFAST and LUNCH). Since the food argument is filled lexically for DINE, the verb does not permit it to be filled compositionally.

Another case where a lexical semantic approach seems able to provide a satisfactory account of syntactic behaviour is that of indirect objects, as I argue below. Many verbs permit an indirect object, and in all cases the indirect object refers to an intended possessor of the theme of the event profiled by the verb. This pattern is, in fact, productive in that it can be used with novel verbs (*SMS her the news*) or in novel combinations with existing verbs (*Wanda waggled me her bid with her ears*). A sensible account for this situation requires a full semantic characterisation of the syntactic dependency. Then the dependent will be allowed to appear with any verb whose (lexical) semantic structure is compatible with that semantic characterisation.

The semantic structure I propose below is, as I argue more fully there, importantly also motivated independently. For example, I propose that the indirect object refers to the possessor in the state resulting from the event profiled by the verb, so that any verb in an indirect object construction must profile a resultative event. The telicity of verbs with indirect objects provides further evidence that they profile resultative events: they are, in Vendler's (1967) terms, generally achievements (the aspectual properties of verbs and constructions are discussed in chapter 4).

A properly developed theory of lexical structure requires at least the following:

- an account of how the meanings of words are formed, how they relate to each other and how they are learned;

- an account of how words and their meanings are related, both systematically and idiosyncratically, and how systematic word/meaning relationships are learned and used productively;
- a structured theory of syntax and other word/word relationships, including derivation, collocation and agreement, together with an account of how the syntactic and other properties of words are derived from their lexical structures;
- an account of the relationship between words and their forms, which explains regular variations in form that correspond to regular syntactic or semantic variations; and an account of the relationships that hold among forms.
- Finally, if the syntactic properties (or some of them) are to be shown to follow from lexical semantic properties of words, then we require additionally an account of how word meanings are combined in compositional structures, and how the relationships between word meanings are projected onto syntactic structure. To infer a linking rule of this sort, we need a robust syntactic pattern and an equally robust semantic pattern and the two need to be clearly related in a regular and explanatory (motivated) way.

It is part of the core purpose of this thesis to ask whether (and show how) WG can provide all of these things. In the following section (1.1.3) I give a sample analysis of three English constructions (from Levin 1993), and in the rest of this chapter I develop the WG framework in order to show what kinds of lexical structure it supports and explore more precisely how it satisfies the requirements identified above.

1.1.3 Word Grammar: a monostratal, declarative dependency grammar; Levin's examples

Word Grammar (WG), the analytical framework used in the second part, will be described at greater length in the following chapter, so I offer here a fairly brief characterisation, that will show that the properties of WG make it possible to exploit and build upon the successes of lexical semantics. WG is a **dependency** grammar, in that all grammatical structure is represented in a network of asymmetric pairwise relationships between linguistic elements (ie words and their meanings). It is also **monostratal**, there being no distinction between 'deep' and 'surface' representations,

and **declarative** as opposed to procedural in that the rules of grammar consist of well-formedness constraints on linguistic structures, rather than procedures describing the construction of well-formed strings. The dependencies (ie grammatical relations) are basic and abstract, so that they provide a rich grammatical structure which is capable of representing generalisations over the properties of words.

Furthermore, the dependency structure is used for both syntactic and semantic representations, so that both syntactic and semantic structure can be described explicitly in terms of the individual functions of particular words and their meanings. This decompositional feature of the framework goes, as I hope to demonstrate, some way towards answering Lehrer's plea: "a major step forward would be to place the work on lexical semantics within a more general semantic and syntactic model." (1988: 206).

By way of demonstration, I shall briefly present a WG analysis of the four verbs (or verb classes) and three constructions discussed by Levin in her introduction (1993: 5-10) (BREAK, CUT, HIT, TOUCH; **conative**, **body-part possessor ascension**, **middle**). Some features of the analysis will necessarily be glossed over here, but all will be addressed in the second part of the thesis. The purpose of the demonstration is to show that the explicit relational structure of WG syntax and semantics allows the relationships between the various verbs (or verb classes) and constructions to be explained in terms of specific features lexically associated with them.

Levin begins her discussion by noting that all four verbs can appear in transitive constructions (the examples in this part are mostly drawn from Levin; the numbering is my own):

(3) Margaret cut the bread.
(4) Janet broke the vase.
(5) Terry touched the cat
(6) Carla hit the door frame.

However, she goes on to point out that they differ as to whether they permit middle (7)-(10), conative (11)-(14) and body-part possessor ascension (15)-(18) constructions. The possibilities are summarised in Table 1 (also from Levin (ibid: 7)).

(7) The bread cuts easily.

(8) Crystal vases break easily.

(9) *Cats touch easily.

(10) *Door frames hit easily.

(11) Margaret cut at the bread.

(12) *Janet broke at the vase.

(13) *Terry touched at the cat.

(14) Carla hit at the door.

(15) Margaret cut Bill on the arm.

(16) *Janet broke Bill on the finger.

(17) Terry touched Bill on the shoulder.

(18) Carla hit Bill on the back.

	TOUCH	HIT	CUT	BREAK
conative	no	yes	yes	no
body-part possessor ascension	yes	yes	yes	no
middle	no	no	yes	yes

Table 1. Four verbs and three constructions.

Next, Levin shows how the patterns in the table can be explained with reference to the respective meanings of the verbs and the constructions.[1] I shall present the relevant semantic properties and show how they can be characterised in terms of specific semantic relationships (the more precise details of the analysis follow the introduction to WG at the end of the chapter).

First the body-part possessor ascension (BPA) construction. This construction is identified by the preposition ON and allows TOUCH, HIT and CUT but not BREAK. Levin argues that the construction is sensitive to the notion of contact, only permitting verbs whose meanings "necessarily involve contact" (ibid: 8). This criterion clearly selects among our verbs in the appropriate way, but how can it be represented and exactly how is the construction to be limited to the appropriate verbs? My claim is that

[1] In fact Levin's account is based on the sensitivity of diathesis alternations to components of verb meaning (ibid: 7). This difference between the two accounts (mine and Levin's) is not relevant here, but it is discussed below.

the lexical semantics of the three verbs that permit the construction must include a touching event.

The result of (non-stative) touching is that the toucher and the touchee are in contact; similarly for hitting. Cutting involves touching as an intermediate stage: the contact between the instrument and the theme results in the final state. Below (1.2.5) I present the relevant semantic structures (those of the verbs and the preposition) in more detail, but for now it is enough to say that the meanings of these three verbs must contain a touching event. This property is enough to license the BPA construction because of the semantics of ON itself. This clearly refers to a touching event (which is one of the things that distinguishes ON from, say, BY) and it is this fact that accounts for the pattern in (15)-(18). When a verb is used in the BPA construction, the preposition refers to the touching event in the lexical semantics of the verb. So in the case of a verb that lacks this component (eg BREAK), the construction is not licensed.

Levin goes on to argue that the conative construction requires a motion component in addition to the contact component that licensed the BPA construction. This follows naturally from the particular meaning of AT in this construction, which is typified by its use with verbs like THROW, as in (19), where the preposition refers to an intended point of contact.

(19) Carla threw a brick at Bill.

In order to satisfy this condition, the thrower must intend the missile to make contact with the referent of the complement of the preposition and the missile must follow a path leading towards the point of contact (though it need not eventually make contact). This requires that the lexical semantics of the verb supply a relevant path and end point. It is for this reason that the construction excludes TOUCH, which does not entail motion.

The explanation for the behaviour of these verbs with respect to the middle construction turns crucially on their force-dynamic properties. The two verbs CUT and BREAK profile a change of state in the argument referred to by the object: this argument is the first argument of the state resulting from the action profiled by the verb (the bread is cut, the vase broken). This contrasts with resultative (ie inchoative) TOUCH,

where the first argument of the result state is the referent of the subject (Terry (or a part of Terry) touches the cat), and with HIT, whose profile does not define a resulting state.

The middle construction is characterised by the presence of a 'modal' element (which may be an adverbial such as *easily/with difficulty* or a modal or auxiliary verb). The subject refers to the theme of a state defined by that modal element. The state is a property assigned to the referent of the subject, relating it to the state referred to by the modal element, which is predicated of the action profiled by the verb: a middle can be glossed something like 'x has the property that it is easy/difficult/impossible/highly possible/... to do y (to it)'.

Levin claims that the verb must profile a change of state, and that the middle's subject refers to its patient (affected argument) and she advances the examples in (20) in support of this claim (1993: 26). However, it is clear from examples like those in (21) that the construction also admits non-resultative verbs.

(20) a. *This metal won't pound.
b. This metal won't pound flat.

(21) a. This wine drinks remarkably smoothly for a 2001 Syrah.
b. How does the Welsh Black eat? [BBC Radio 4: *The Food Programme*]
c. Pinker's new book reads very well.

The subjects in (21) do all refer to the patient of the verb's sense: though eating, drinking and reading do not necessarily refer to telic (resultative) events, they nevertheless do refer to affective events (ones where some process is carried out on the patient). In chapter 3 I define a class of affective dynamic events which have both agents and patients and my claim here is that the middle construction admits only verbs that can have a sense in this class.

Levin assigns further semantic properties to the middle construction: it is understood generically both with respect to time and with respect to the agent. This is explained by the fact that it is the sense of the verb that appears as the second argument of the state referred to by the middle: the sense of a verb corresponds to the most

general such event, and has an unspecified time and agent. Notice that when the past tense is used in a middle, it determines the time of the state, and not of the event:

(22) The car started perfectly until that day when it got stuck in the river.

Rosta (1995) argues that these semantic properties are merely accidental properties of the middle, advancing examples like those in (23) that are not construed generically. Under the analysis found here, these examples involve a separate construction (unaccusative) and so do not provide counterexamples to the semantic constraints on middles. See chapters 3 and 5 for more discussion of unaccusatives.

(23) a. The door wouldn't open (yesterday/when I tried it).
b. The door opened to Kitty but not to me.

In the above discussion I hope to have given an impression of the benefits associated with explicit and decompositional lexical structure. In the following section I present a more detailed description of the WG analysis, which will permit the explanations offered above to be stated more clearly. A full and explicit treatment of the three constructions is given in 1.2.5.

1.1.4 Structure of the thesis

In the remainder of this chapter I introduce the properties of WG and the **network analysis** that is so important in the following chapters. I outline the declarative network that constitutes WG grammatical structure and introduce structures for specific (classes of) words, word meanings and dependencies.

Chapter 2 forms an introduction to **lexical semantics**. I begin by identifying some assumptions common to all approaches to lexical semantics: the notion of **semantic competence** and lexical semantic competence; properties of word meanings including **sense** and **reference**, **semantic relationships** like meronymy and hyponymy and ambiguity; and properties of **compositional meaning** including logical relationships between compositional structures, the principle of compositionality and the linking of syntactic and semantic arguments.

In 2.2 I identify three different approaches to the study of lexical semantics: **structural**, **translational** and **conceptual** approaches. I discuss the characteristics of each approach, using examples from a range of frameworks and I go on to compare the WG framework with these other approaches. I position the WG framework with respect to the three classes and identify some (more or less contentious) issues that divide the various frameworks: **universality**, **primitives** and **discreteness**.

In the last three chapters I look more closely at three areas of linguistic structure, applying the WG framework and providing a more detailed analysis of a set of verbs to illustrate the principles discussed.

In Chapter 3, I explore the details of **argument linking** in WG. First I introduce some of the data that a theory of linking needs to account for; next I discuss some existing approaches to argument linking, classified according to whether they treat predicate classes or thematic roles as basics of the analysis; then I present a WG account that combines the properties of both kinds of approach.

I go on to illustrate the linking mechanism of WG by applying it to the analysis of **verbs of motion**. I show that motion events (the meanings of verbs of motion) are defined by their paths and their results, and that some specify also a manner. I examine the different linking properties of the various classes of motion verbs and conclude that these linking properties are determined both by force-dynamic and by thematic properties of motion events.

In chapter 4 I explore the representation of **aspect** in WG. I introduce Vendler's (1967) aspectual classes and consider some refinements of Vendler's classification made by Croft (1998b). I present a WG analysis based on individual and identifiable semantic properties some of which are also used in the quantification of nouns. The diagnostics commonly used to identify the aspectual classes are shown to follow from the relevant semantic structures.

I apply the analysis of aspect, particularly of telicity, in an account of **resultative expressions** in English. I consider some existing approaches to the analysis of resultative expressions and some conclusions that have been drawn from their behaviour (chiefly that English has syntactic **unaccusativity**). I present the relevant WG structures and show how they explain the syntactic and semantic properties of resultative expressions with all kinds of verb: those that select resultative expressions

predicated of the subject or of the object and those that can be used alongside unselected resultative expressions. I provide an analysis of the resultative construction as a prototype category.

In the final chapter (5) I consider the treatment of **ambiguity** in WG. I begin by looking at some other classifications or treatments of various kinds of linguistic ambiguity. I go on to present a WG classification of ambiguity which recognises eight structural possibilities some of which would be described as ambiguous; the range of possibilities derives from the fact that WG lexical items have three levels of representation - formal, syntactic and semantic - and that a single form may be associated with more than one set of syntactic properties, or with more than one meaning, and so on.

I go on to consider a particular case of ambiguity: the '**causative alternation**'. I present the relevant data before exploring some analyses of this phenomenon (those of Croft (1990), Levin and Rappaport Hovav (1995) and Lemmens (1998)). I finish by presenting a WG analysis where the two 'poles' of the alternation are independent **constructions** and the lexical structures of the alternating verbs are compatible with both.

1.2 Introduction to Word Grammar

1.2.1 Properties of Word Grammar: dependency, cognitive and construction grammars; classificatory and associative relationships

This section contains a fairly detailed introduction to the theoretical and analytical basis of Word Grammar, the framework applied in the second part of the thesis. Word Grammar (WG) is a generative grammar which dates from the early 1980s (see Hudson 1984). The theory has undergone some development since then, though the basic assumptions remain broadly the same (they are spelt out in Hudson 1990: 10-14). A clear and simple description can be found in Hudson (1994, 2000); Hudson and Holmes (2000) give an exploration of WG lexical structure and Holmes and Hudson (2004) explore how these lexical structures constrain syntactic composition. The WG web site at http://www.phon.ucl.ac.uk/home/dick/wg.htm contains a great deal of downloadable material (including an 'Encyclopedia of Word Grammar and English Grammar').

I proceed with my own description of the theory here for two reasons. First for those who are unfamiliar with WG, who if they are to understand the analyses in the second part need to be aware of particular features of the theory and its connection with other frameworks. Second, it should be of interest to those who already work within (or with) WG, since I identify the features of the theory that I use in the later part and outline my position with regard to some issues that either are not yet clearly resolved or are under explicit contention (I do not intend to go into the details of any strictly theory internal controversies).

The present work serves two purposes: to provide a meaningful and satisfactory account of the grammatical phenomena discussed in the second part, and to recommend the properties of WG. The description of WG in this part provides a necessary preface to its use in the descriptive and analytical work in the second part, and to some extent determines the success of that part. The analysis itself, to the extent that it is successful, provides a demonstration of the value of the theoretical mechanisms and assumptions I introduce in the introductory sections.

In this first part of this section I identify three theoretical traditions with which WG can be associated, by virtue of shared properties and assumptions. These three traditions, **Dependency Grammar**, **Cognitive Linguistics** and **Construction Grammar** are described as parents of WG, not in a causal but in a logical sense: WG is a Dependency Grammar because it makes use of dependencies, it is a branch of Cognitive Linguistics since it views language as a proper part of wider cognition and the structures of language as conceptual structures, and it is a Construction Grammar in that it sees no formal distinction between lexical and syntactic structures. These three inheritance relationships are discussed here, where I also identify their consequences for the linguistic descriptions developed in the WG framework. The properties identified under these three headings overlap somewhat, as could perhaps have been expected, though this does not detract from the usefulness of the division for expository purposes.

Word Grammar is a Dependency Grammar (DG). Dependency grammars have a long history, particularly in Europe (see Covington (1984), Engel (1992), Erben (1958), Fraser (1994), Levelt (1974 a, b), Mel'cuk (1988), Owens (1988) and Tesnière (1959) for details of the development of dependency grammars) and they are

characterised in that, in a DG, words and the relationships between them (dependencies) are the only primitives of linguistic structure. This means, for sentence structures, that they do not refer to phrasal categories or other word strings (though some dependency grammars do make some use of phrases, and even WG makes use of word strings, in coordinated structures), and for lexical and grammatical structures that they too only refer to (classes of) words or dependencies.

This first consequence is not as significant as it may seem, since dependency structures are logically equivalent to phrase structures, as long as the phrase structure is restricted to binary branching. The second consequence (that lexical and grammatical structures refer only to classes of words or dependencies) is much more significant: it can serve by itself as the premise for the lexicalist position described above.

Word Grammar is a branch of Cognitive Linguistics. As noted above, WG can be considered a branch of Cognitive Linguistics in that it sees (knowledge of) language as a proper subpart of the conceptual structure that constitutes more general knowledge ('the mind'). This view is shared by many writers working within the broad tradition of cognitive linguistics (see eg Dirven and Verspoor 1999, Geeraerts 1990, 1995, Langacker 1991, 1998, Taylor 1998, Tomasello 1998a, 1998b). It is also advocated by Fillmore and Kay, among the primary exponents of Construction Grammar, as described below:

> "Among current non-modular approaches to grammar, CG places great emphasis on the fact that probably any of the kinds of information that have been called 'pragmatic' by linguists may be conventionally associated with a particular lexical form and therefore constitute part of a rule (construction) of a grammar." (Kay 1997: 123).

In WG this view is intimately bound up with the notion of dependency and of network structure. Since the properties of words are exclusively determined by the relationships between them and other concepts, those other concepts must themselves be of the same formal type: they are nodes in the same conceptual framework (and their properties are therefore in turn determined by the relationships they support). Since the meanings of words, and their sociolinguistic or connotational properties, form part of what language users need to know about their language, these properties

must also be represented in the conceptual network: words and their meanings are concepts of the same kind.[2]

The significance of this view is twofold. First it carries with it the responsibility to account for all properties of any phenomenon under investigation, since properties cannot be simply assigned to the extralinguistic component if they are not amenable to explanation. Second, and more favourably, it allows a wider range of information to be used in explaining observed patterns. For example, much of the analysis in the second part turns on the application of 'encyclopedic' (as opposed to purely 'lexical') semantic properties of the words involved.

Word Grammar is a Construction Grammar (see eg Fillmore 1988, Fillmore and Kay 2000, Goldberg 1995, 1997a, 1997b, 1998, Kay 1995, 1997, Shibatani and Thompson 1996). In Word Grammar, as it is described here, all the regularities of language are represented in a network of more or less schematic lexical representations, a **constructicon** (Jurafsky 1992). This view of language is expressed by Fillmore, describing Kay's construction grammar as "an approach to language according to which there is no sharp distinction between the lexicon and the non-lexical parts of grammar" (1997: ix). In the WG framework it follows from the dependency principle: relationships between words are described in terms of dependencies, and regular patterns in the structures that (classes of) words participate in are described in terms of generalisations over dependencies. These (classes of) dependencies are represented, as is made clear below, in the same lexical structure as words and word classes.

This view, like the other two, is lent support by the demonstration that it succeeds in accounting for the observed behaviour of linguistic structures. The claim is that, for any linguistic pattern that may be encountered, an account can be developed that satisfactorily describes and explains the observed behaviour without departing from the monostratal (declarative as opposed to procedural) grammatical structure implied by the constructionist view.

---

[2] In talking about the conceptual network and the relationships that define the properties of concepts in what follows, I try to reserve the term **dependency** (and **dependent**) for syntactic relationships (the directly syntactic properties of words and word classes), using the more general term **association** (and **associate**) for those relationships that hold between concepts in other parts of the network.

The framework outlined above can be characterised as follows: knowledge of language (indeed all conceptual structure) consists of a network of concepts joined by (asymmetric and binary) classificatory (**isa**) relationships, which support default inheritance, and **associative** (including **dependency**) relationships, these two kinds of relationship exhaustively defining the properties of the concepts.[3] This network, which is explored in greater detail in the following section, has two important and useful consequences. It permits a fine-grained analysis of linguistic structure, which proves highly explanatory, and it means that generalisations can be made over linguistic categories when appropriate and using the same mechanisms as are used for more specific, idiosyncratic linguistic properties.

The statement of generalisations over linguistic types is an important part of the lexical structure of WG. The power of the **default inheritance** mechanism (see Briscoe, Copestake and de Paiva 1993, Hudson 2000, Kilgariff and Gazdar 1995) is that it allows these generalisations to be stated at the most appropriate level (usually this is considered to be the most general level possible). This means that where a particular syntactic or semantic property applies to a class of words, it need be represented only once in the lexicon, at the level of the appropriate class (for example, all verbs may have subjects). It also means that where two properties apply to different classes of words, they must be represented separately, each at the appropriate level.

(24) Sam cooked.
(25) Sam cooked an egg.
(26) Sam cooked Edna an egg.

This principle is exemplified in (24)-(26). The relationship between the subject and the verb is no different in (26), where it appears alongside a direct and an indirect object, from that in (25), which lacks the indirect object, or (24), which lacks both the indirect and the direct object. The relationship between the verb and the object is similarly independent of the other two dependencies, so both of these relationships (subject and object) can be defined without reference to the other two. Furthermore, since the classes of verbs that can appear with a subject, an object and an indirect

[3] The two kinds of relationship are discussed in more detail in the following section (1.2.2).

object differ, the three properties must be associated with different categories. A full analysis of all three syntactic relationships follows shortly (1.2.3.3, 1.2.4.2, 1.2.4.3).

In contrast to properties like these that apply to whole classes of lexical words, some properties apply only to a particular lexical item. These must, of course, be represented at that more specific level. For example, the fact that DEPEND takes ON as its complement is specific to that lexical item. Some lexical properties are specific only to some instances of lexical items. For example, while PUT takes a noun object and a prepositional complement, there is a special subcase of PUT (call it PUT/up) which takes UP as a particle and WITH as a prepositional complement, as well as having specific semantics (it refers to an act of tolerating):

(27) Oscar can put up with anything except for irritations.

1.2.2 Structure of the conceptual network: classificatory and associative relationships

The properties of linguistic (and other) concepts are defined exclusively by the relationships they support. As stated above, those relationships are of two kinds: classificatory relationships, which support default inheritance, and associative relationships (including syntactic dependencies), which can be thought of as functions from one concept to another. The various properties of these two kinds of relationship are explored in this section. A preliminary example is given in Figure 1.

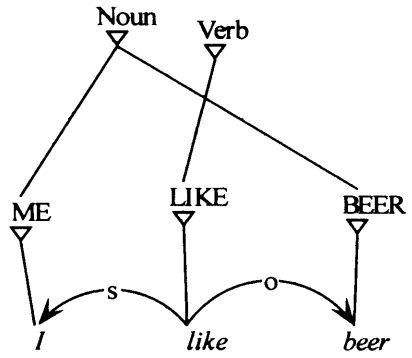


Figure 1 *I like beer.*

The diagram shows the two kinds of relationship at work in the field of syntax. It shows (somewhat simplified) the syntactic structure of a three word sentence of English. The words are linked by **isa** relationships (shown by the inverted arrow at the

supercategory joined by a line with the lower category) to the lexemes they instantiate, which are in turn linked by isa to word classes. The words are linked to each other by the syntactic **dependency** relationships subject and object (like all associative relationships, these are shown by labelled arrows pointing from the parent to the associate; the arrows are, in this case, labelled *s* and *o* for subject and object respectively).

The classification of the words into lexemes supports their other features: *like* isa LIKE, which supports the object relationship; it also isa (tensed) Verb, which supports the subject relationship. *I* and *beer* both isa Noun, which makes them good candidates for the subject and object of the verb. *I* is a particularly good candidate for the subject because of its form. For some English speakers (myself included), the form {I}[4] is used only in subject position. The lexical entry for ME is shown in Figure 2. The form of the pronoun is {me}, but some subcases of ME, which are subjects, have the form {I}. This is mediated by the **default inheritance** mechanism: subcategories inherit properties from supercategories unless they are overridden by specific properties of the subcategory. I also show in the diagram that the referent of ME is the same as its speaker. This provides a further example of the default inheritance mechanism, since it overrides the usual means by which a word's referent is assigned (the usual means by which a word's referent is assigned are outlined below (1.2.4)), and also provides a good example of the interaction of linguistic and extra-linguistic properties.

[4] {I} and {me} are morphemes. They are idealisations of the formal properties of words. They are realised in structured arrangements of letters (writing) and phones (speech).

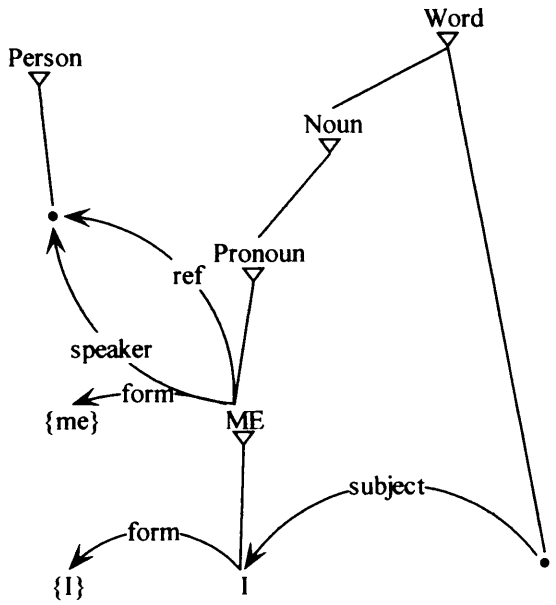


Figure 2 I and ME.

In the case of I and ME, the overriding category is a lexical one (lexical structures are discussed in greater depth in the following section), but exceptions can also be associated with contextual categories (tokens):

(28) I laik beer.

(29) She liked beer.

The verb in (28) is, unconventionally, spelled *laik*, but it can still be identified as a token of LIKE, since it has enough of the relevant properties.[5] The verb in (29) is more interesting. It is spelled /liked/, which marks it as the past tense of LIKE: the difference in form is regularly associated with a particular semantic property. This is mediated in WG by another property of the isa relationship: **multiple inheritance** (see Hudson and Fraser 1992). Creider and Hudson (1999) provide a WG analysis of inflectional morphology whereby inflections are themselves word classes and inflected word forms inherit both from their lexeme and from the inflectional category. Figure 3 shows how this works.

[5] The assignment of tokens to types is mediated by the principle of **best fit** (as is the assignment of all linguistic structure to utterances). This principle prefers the analysis that fits most closely with the properties of existing concepts. The second word in *I kail beer* is not likely to be analysed as a token of LIKE (unless of course I clearly like beer too much).

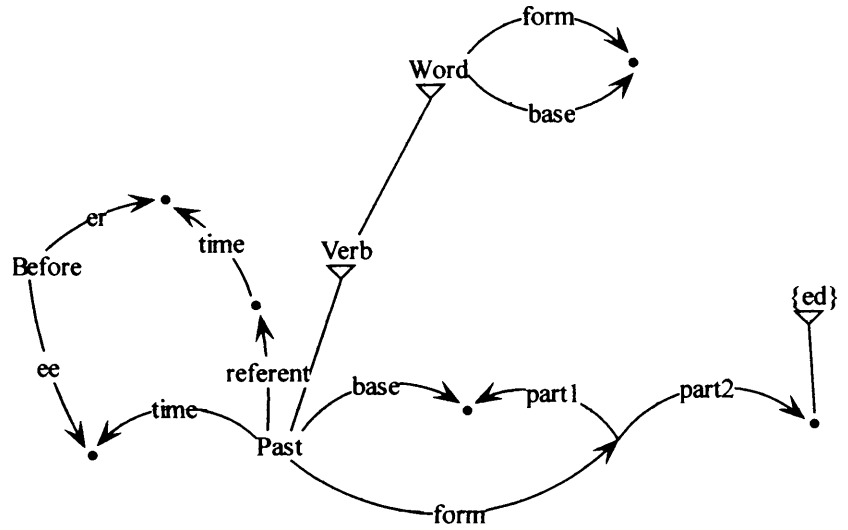


Figure 3 Past tense verbs.

The form of a verb token (which by default is the same as its base) consists of the base plus {ed} when the token is also an example of Past, the class of past tense verbs. So, *liked* in (29) has the form it has because it isa both LIKE and Past-verb, just as it inherits aspects of its meaning from those two categories. In this way, regularly inflected forms need not be stored in the lexicon: they simply appear as tokens that inherit from two types at once, as shown in Figure 4.[6] Verbs with irregular past tenses override this principle (Figure 4).

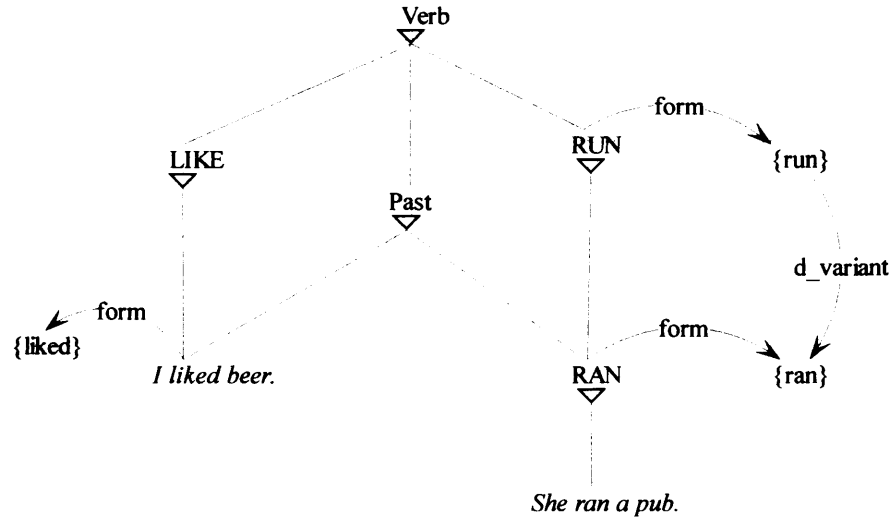


Figure 4 Regular and irregular past tenses.

[6] It cannot be ruled out that some (or all) high-frequency regular forms are in fact stored in the lexicon. There is some evidence that this is indeed the case (Bybee 1995: 450-451). In cases where both regular and irregular forms exist (eg DREAM) the regular form **must** be stored.

The multiple inheritance mechanism features strongly in what follows, both in the online generation of regular categories and in the lexical representations of stored ones. It is not only applied in cases of derivational morphology, but also crucially in the interaction between verbs and constructions. It is further explored in 5.2.3.4.

The **type/token** distinction introduced above is an important one in WG and is an unavoidable consequence of the network analysis. Since a concept is defined only by the relationships it supports, any two concepts that have all the same properties (support all the same relationships) must be identical: they can occupy only one node in the network. Conversely, any two concepts that differ as to one or more property cannot occupy the same node in the network. The relationship between words and their lexemes provides a good example of this principle. The word (token) is an event that forms part of an utterance. Each lexeme (type) can be used many times in different utterances (or even within one utterance), on each occasion with a specific time and speaker and (quite possibly) with a divergent form ((28), (29)), valency, meaning etc. For this reason the word and its lexeme must be treated as separate concepts.

I turn now to the second primitive of linguistic structure in WG: the **associative** relationship. The four relationships subject, object, form and base that I use above are all examples of associative relationships. An association can, as I said above, be thought of as a function from one concept to another. For example, in (29) above, *She* is the (unique) subject of *liked*. This relationship is represented in the diagram by the labelled arc shown in Figure 5; alternatively it can be represented in normal prose, as in the previous sentence, or as a predicate, as also shown in Figure 5.

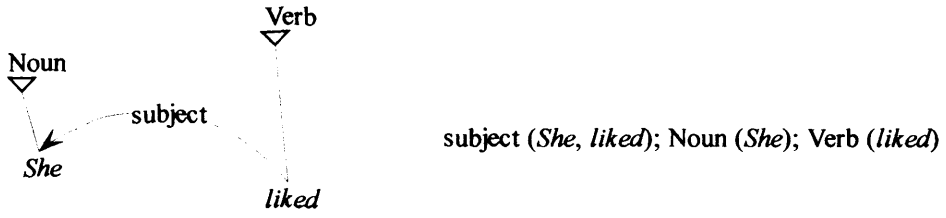


Figure 5 The subject relationship.

Notice that the predicate is not the verb but the subject relationship. *She liked beer* is represented as 'subject (*She*, *liked*); object (*beer*, *liked*)' not as '*liked* (*She*, *beer*)' since the verb and the nouns are elements of the same kind: they are concepts. This principle and the flexibility it affords will also be important in the following sections.

Associations have another two significant properties: they are **asymmetric** and they are **classified**.

Associative relationships are **asymmetric**: they are functions from one element (the **parent**) to another (the **dependent** or **associate**). The dependent is a property of the parent, and varies with it. In many cases, a parent may have more than one dependent of the same kind, though the number of parents of any one kind is limited.

This asymmetry is important in the selection and control of some syntactic dependents (**valents**): a valent is always selected by the parent (putting it somewhat simply, verbs have subjects, not vice versa). The dependency relationship in turn selects the properties of the dependent: subjects are (typically) nouns, they typically precede their parents, *I* is used instead of *me* etc.

The asymmetry of dependencies has a second consequence in syntactic structure. In grammatical sentences, all the words are connected by one or more ("upwards") dependency relationships to a single word (the **root**), which is itself independent. In this way a word's parent provides its connection to the rest of syntactic structure. This allows an emergent (non-primitive) and informal (grammar external) definition of phrases, for word order purposes, as consisting of a word and all its subordinates (dependents or subordinates of dependents).

Dependencies are also **classified**. This is implied in the practice of labelling the dependency arcs: to say that *I* is the subject of *like* in (30) and *Fish* that of *can* (and indeed *swim*) in (31), or to say as I did of (24)-(26) that the relationship between *Sam* and *cooked* is the same in all three, is to say that there are significant similarities between these relationships that cannot be described in any other (simpler) way.

(30) I like fish.
(31) Fish can swim.

The subject relationship collects together (in a way that is made clear below in 1.2.4.3) the various properties associated with subjects: word order, verb agreement, obligatoriness (with tensed verbs), merger with object in passive constructions (see below), semantic role etc. The fact that these properties should commonly cluster together in the way they do is the motivation (for linguists and (English) language

users alike, is the claim) for recognising the subject relationship as the category whose properties they are.

Syntactic dependencies in English can be classified as in Figure 6

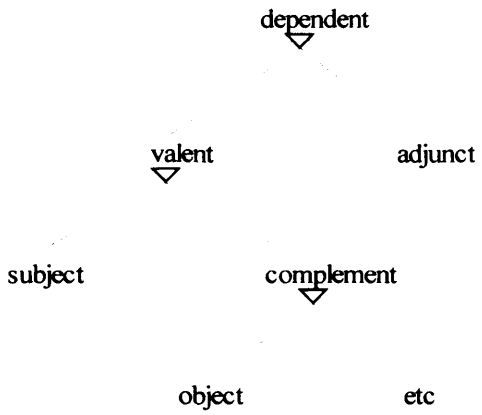


Figure 6 Classification of dependency types (for English).

Some dependents are selected by the parent. These are **valents** and they include **subjects** (which appear before the verb) and **complements**. Complements are further subdivided into **object** and some other complement types. Unselected dependents are **adjuncts**.

I assumed above that all of linguistic (and indeed conceptual) structure is constructed out of inheritance and associative relationships. This means that associations can also be classified according to whether they are semantic, syntactic, lexical, morphological etc. However, like the definition of phrases, this classification has no theoretical (grammatical) status, since nothing follows from the classification of an association relationship as syntactic, lexical or whatever in this way. Syntactic associations (dependencies) can be defined informally as those relationships that hold between words, semantic associations as relationships holding between meanings and so on but, since this is their only distinguishing feature and it is already represented in the grammar, no more need be said.

The same principle holds for linguistic concepts at each level: syntactic concepts (words, lexemes, etc) are identifiable by the fact that they support syntactic relationships, semantic concepts (events, situations, concrete objects, etc) by the fact that they support semantic relationships, and so on, but they share no other significant properties. WG structure is quite clearly stratified into broadly traditional levels, but does not require the concepts or relationships at different levels to be of different

formal kinds. Since the only distinguishing feature of concepts at different levels is that they typically support different sets of associations, and this is already implicit in the structure of the grammar, there is no need for an explicit representation.

The classification of syntactic dependencies is explored further, with examples, in the following section, where I deal in rather more detail with the lexical structures of WG, showing how they constrain the structures of utterances.

1.2.3 Structures of Word Grammar: words; meanings; dependencies

The structures discussed in this section range over all areas of the grammar. I deal with lexical and contextual structures, with morphological, syntactic, semantic and other properties of words and of relationships between them. I have divided the section into three parts, dealing with grammatical structures in WG under the headings **words**, **meanings** and **dependencies**, entirely for ease and clarity of presentation. Again, there will necessarily be considerable overlap between these three parts.

In the first part I deal with the structures surrounding words. I discuss lexemes (the lexical representations of words) and word classes, word tokens and their relationships with other concepts in context, the relationships connecting words and their meanings (both lexically and in utterances), and relationships holding between lexical words.

In the second part I look more closely at semantic structures. I look at the (lexical and contextual) meanings of words and the structure of the semantic network; I look at the relationships between syntactic and semantic structures and introduce the **syntax-semantics principle**, the lexical structure underlying semantic composition; and I look at the way in which the meanings of the parts of utterances combine to determine the semantic properties (logical and discourse functions, aspectual properties, etc) of the utterance.

In the third part I show how the properties of dependency classes are represented in lexical structures ('constructions') and how these representations serve to constrain the combinatorial properties of words.

1.2.3.1 Words

The behaviour of words in context is determined by a number of factors. These derive in part from the properties of the word and in part from the properties of the context. The properties associated with the word, its lexical properties, are attached to it through the lexeme it instantiates, or they derive from the properties of other (eg inflectional) categories. In most cases, a word's lexeme determines most of its form (at least in languages like English) and meaning. It also determines (or at least affects) the number and nature of some of the word's dependents. Some of these lexical properties (commonly including the form and meaning) are specific to the lexeme; some are shared by a class of words.

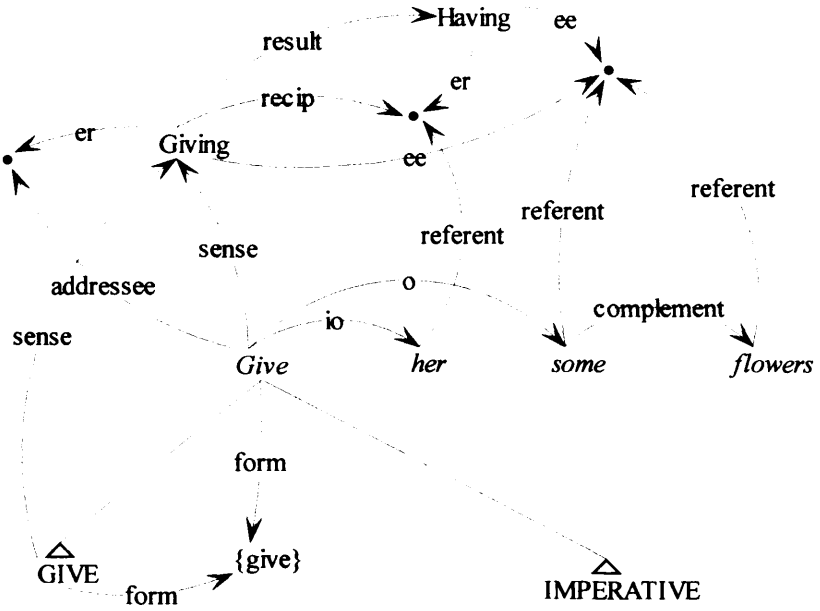


Figure 7 *Give her some flowers.*

Figure 7 shows a partial structure for the sentence *Give her some flowers.* A number of the properties of *Give*, the first word, are shown: it has an **indirect object** (io in the diagram), *her*, and an **object** (o in the diagram), *some*; it has a **form**, {give}, and a **sense**, Giving. The form and the sense are the same as the form and sense of the **lexeme** GIVE, which the word token instantiates. As stated above, most English words inherit their form and sense directly from their lexeme. Contextual meaning is associated with the **referent**, which instantiates the sense; the relationship between sense and referent is explored shortly but here I consider the properties of the sense, which need to include those aspects of meaning common to all uses of GIVE.

Giving must clearly have a result, which isa Having: if I give you something, the result is that you have it.[7] Furthermore, some of the arguments are shared between these two concepts: the 'givee' (the gift, the **ee** of Giving in the diagram) is the 'havee' (the possession, the **ee** of the Having in the diagram), and the 'haver' is the **recipient** (recip in the diagram) of the giving.[8] These two semantic arguments are also linked to syntactic arguments: they are the referents of the object and indirect object respectively. This is all the semantic analysis I provide for Giving at this stage, though it must have further semantic properties, since the structure shown would also apply to Donating, Bequeathing and many other events. Some of these further semantic properties are considered below, where I also look more closely at the result relationship.

Giving also has a giver, who must have control over the givee and who is responsible for the transfer of possession. In Figure 7, the giver is not linked to a syntactic dependent of the verb. Since the verb is imperative, the er of its sense is understood to be the same as its addressee (which is also shown in the diagram; this very simple integration of different properties of words is one of the strengths of the non-modular structure of WG). This property is clearly not specific to GIVE, since it applies to all imperative verbs (and all (non-stative) verbs can be imperative). The presence of an object and an indirect object, however, as well as the semantic relationships between them, are much less general.

(32) and (33) provide some evidence of the difference between subjects on the one hand and objects and indirect objects on the other. The anaphoric verb DO (SO) shares part of its meaning with the preceding verb, referring to an event of the same type that differs only as to the time (or place or any other circumstantial property) and the giver (in (33) WE is repeated, so that in this case the ers are the same). It is not possible to use DO (SO) to refer to a Giving event with a different ee or recipient:

(32) a. We gave her a record on Thursday and they did so too.

b. *We gave her a record on Thursday and they did so him (a book).

[7] Equally clearly, the result cannot **be** Having, since that would mean that all Havings result from a Giving (that it is impossible to have anything without having been given it).

[8] The relationships er and ee are discussed below (3.1.4).

c. *We gave her a record on Thursday and they did so a book.

(33) a. We gave her a record on Thursday and on Friday we did so again

b. *We gave her a record on Thursday and on Friday we did so him (a book).

c. *We gave her a record on Thursday and on Friday we did so a book.

If this is a semantic constraint it is a strange and stipulative one, since there is no apparent reason why two concepts should be forced to differ as to two of their arguments. Fortunately, however, there is a ready syntactic explanation: GIVE takes a direct and an indirect object, whereas DO does not.

This evidence suggests that the direct and indirect objects and the semantic structure that comes with them are lexically associated with GIVE (they are **valents**). However, there are also compelling reasons for wanting to treat the indirect object relationship (as well as the object relationship) as a construction independent of the lexical structures of these verbs: the large number of verbs to which it applies, its productivity and the regularity of its use even in highly irregular contexts to name but three. Some of these are discussed above, where I argue for a construction-based account of the indirect object and, later, where I look more closely at classes of verbs sharing the same valency and further develop the construction-based account.

For now it is clear that the lexical properties of words derive from categories at various levels of generality: some properties are common to all words, some to all verbs or to another of the major word classes, some to a subset of verbs or of some other word class, and some to particular words.

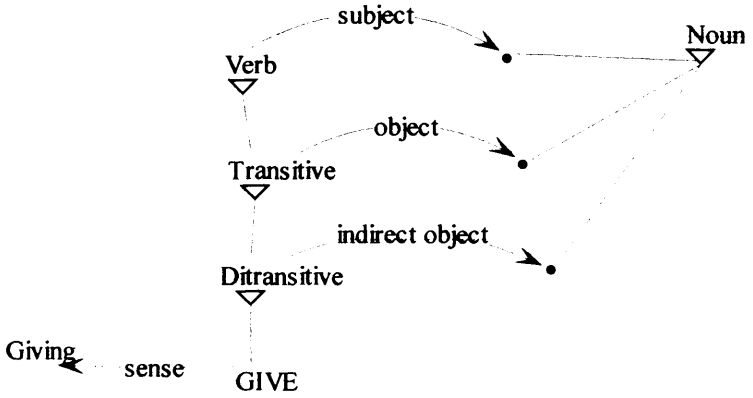


Figure 8 Some lexical properties of GIVE.

Figure 8 gives a rather simplified sketch of this position, showing that the subject is a property of all verbs (this is, of course, a simplification since some verbs do not have subjects, and indeed some non-verbs do) and that the object is a property of some verbs (the transitives), also that some of these have indirect objects and that GIVE is such a ditransitive verb. This position is refined shortly (1.2.3.3).

Also included in the lexical properties of a word are its relationships with other lexemes. For example, the meanings of the nouns GIVER and GIFT are related to that of the verb GIVE already discussed. The senses of these two nouns fill respectively the er and ee roles of a giving event, as shown in Figure 9.

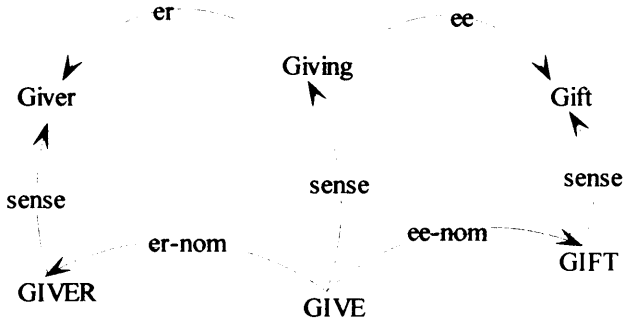


Figure 9 GIVER, GIVE, GIFT.

The figure also shows a lexical relationship between GIVER and the verb, which I have labelled er-nom, for **er-nominal**, and one between the verb and GIFT, which I have labelled ee-nom. The first of these lexical relationships must form a part of the grammar, since the pattern it represents is both general and productive (many verbs support an exactly comparable relationship, even novel ones). The pattern involves the semantic relationship identified, which is paired with a regular formal relationship: the form of the er-nominal consists of the base of the verb, followed by {er}. These properties are shown in Figure 10.

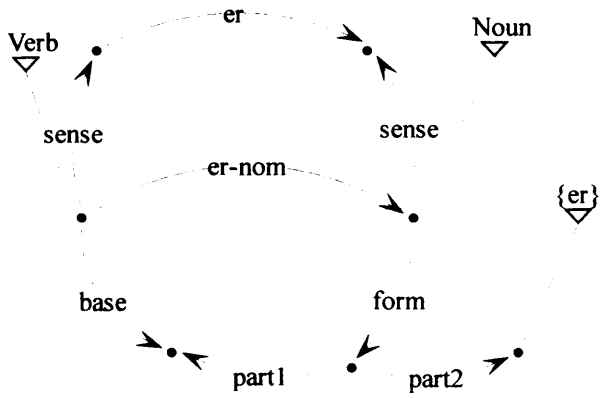


Figure 10 The er-nominal relationship.

The ee-nominal relationship is less obviously a necessary part of the grammar since, though there is evidently some relationship between the forms, the pattern is not productive.

Notice that just as there is irregular inflectional morphology (see Figure 4), so there is also irregular derivational morphology. For example, VENDOR is (arguably) more natural than SELLER as the er-nominal of SELL.

1.2.3.2 Meanings

The link between words and their meanings is mediated by the **sense** relationship. It connects a word, a concept that functions as the locus for a set of syntactic properties, and its sense, a concept that functions as the locus for a set of semantic properties. In this way it is a symbolic relationship: the word is symbolic for the sense and the rich network of semantic properties that surrounds it. I show below that syntactic dependencies can also take part in symbolic relationships, and so control the integration of the semantic structures associated with words in context.

The semantic properties of the sense are, as I have said, represented by a network of relationships which is formally similar to the network of syntactic relationships. As I also say above, there is no restriction on the kinds of information that are associated with the lexical sense of a word. Since it is the only locus of information about the word's meaning, anything that language users know about that meaning must be represented here. For example, both donating and bequeathing are kinds of giving, as mentioned above. However, they differ in a number of properties

from general giving, as represented in the semantic structure provided in Figure 8 above.

First, Donating is special because the recipient is some sort of charitable organisation. There is also a strong implication that the gift is money, to the extent that when the verb is used without an object, it is understood as referring to the gift of a sum of money. Bequeathing is different in that the time of the result is separate from the time of the bequeathing, coming as it does after the death of the bequeather. These properties are shown in Figure 11.

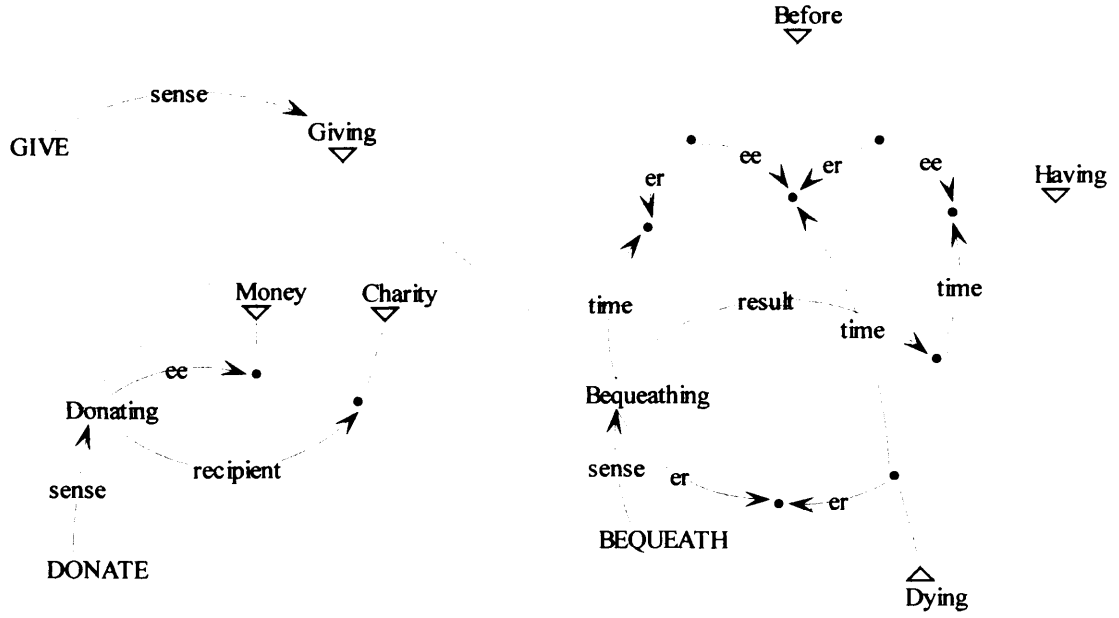


Figure 11 Giving, Donating, Bequeathing.

Furthermore, if I know that Donnie has donated five pounds to the donkey sanctuary or that elderly ladies often bequeath money to cats homes, then that information must also be represented here (associated with sub cases of the senses shown).

The isa relationship, and the type/token distinction it supports, have an important consequence for the linguistic semantic structure of complex constructions. While the sense represents the lexical meaning of a word, its contextual meaning is represented by the **referent**, which instantiates the sense. The verbs in (32) and (33) above each refer to an act of giving, distinguished from other, similar, events by its time and place and other circumstantial properties, and by the identity of some of the participants. This is how contextual meaning is usually determined, though there are exceptions to this principle: most pronouns have no sense, for example, and find their

referent in the context (as shown above (1.2.2) the referent of ME, a deictic personal pronoun, is the same as its speaker).

The specialisations of the sense that determine the properties of the referent are typically introduced by the meanings of other words in the context, as mediated by the **syntax semantics principle** (SSP) (Hudson 1990: 132). This is represented schematically in Figure 12, and given in prose in (34). The SSP, as shown here, corresponds to the bijection principle of Lexical Functional Grammar (Bresnan 1982) and to the projection principles and θ-criterion of GB (Chomsky 1981: 36, 38).

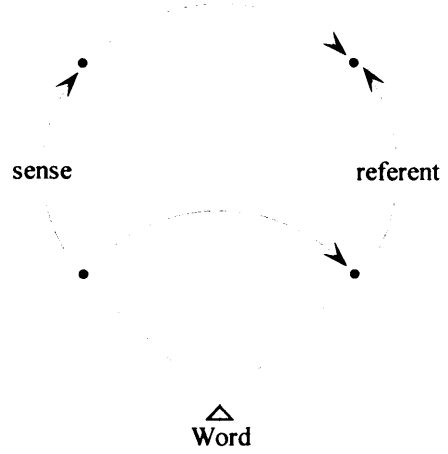


Figure 12 The syntax-semantics principle.

(34) **Syntax Semantics Principle** (SSP): a word's dependent refers to an associate of its sense.

I argue below (1.2.4, 1.2.5, 2.2.2) that this principle needs to be revised to the extent that it applies reliably only to valents (selected dependents). Adjuncts often refer to **parents** of the sense of their own parents, reversing the SSP (as in Figure 13, whose structure I discuss below). The syntactic dependencies are from *cup* to *on* (*on* is the adjunct of *cup*) and from *on* to *the* (*the* is the complement of *on*), yet it is the meaning of the preposition that acts as the parent of the other two meanings in the semantic structure: the referent of *the* is the ee (for second argument) of *on*'s sense, and the sense of *cup* is the er (first argument) of its referent (compare the semantic structure of

cup ***which is*** *on the table*, where *which* corefers with *cup* and is the subject of the predicate in the relative clause).

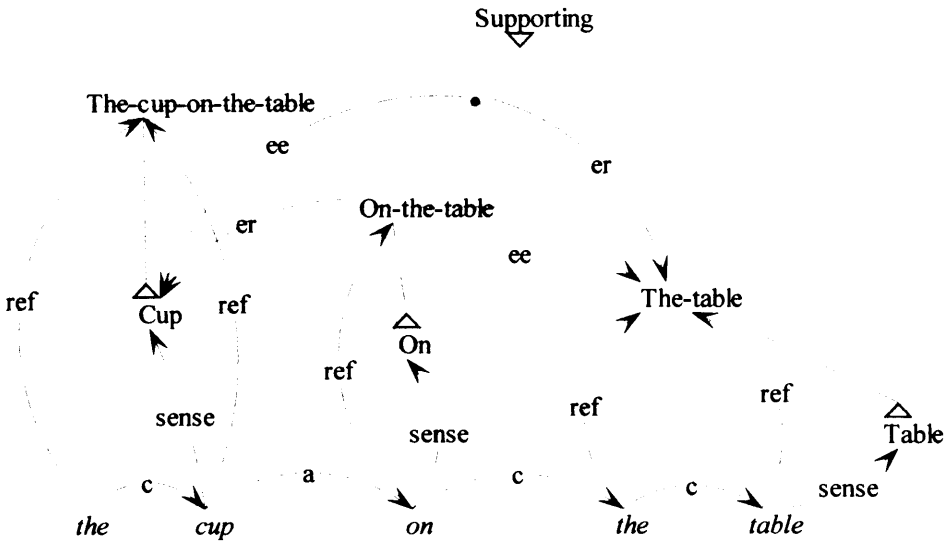


Figure 13 *the cup on the table.*

Other adjuncts may refer to associates of their parent's sense, conforming to the SSP. For example, a temporal adverbial like *one day* refers to the time of its parent's sense, so this case conforms to the same pattern as that that applies to valents. Others are more complex. For example, the adjective in (35) appears to modify the sense of its parent's parent's parent (Sally did not date someone who was occasionally a sailor, but occasionally she dated someone who was a sailor).

(35) Sally dated the occasional sailor.[9]

There is a further possibility, which is that a word and its dependent corefer. This possibility is found with both valents (*the cup* as shown above) and adjuncts (*boy who*). Other cases where a word and its dependent corefer include apposition and some prepositional constructions (eg *City of Glasgow*) and some auxiliary verbs (*You did come*) and 'light' verbs (*We had a smoke*). These (and other) exceptions notwithstanding, the default for valents is that they conform to the SSP, which can therefore be revised as in (36).

[9] This example is due to Joe Hilferty (www.jiscmail.ac.uk/lists/wordgrammar.html). Dick Hudson argues (convincingly) in the same place that *occasional* depends not on *sailor*, as I have assumed here, but directly on *the*. The point remains the same.

(36) **Revised syntax-semantics principle** (RSSP): a word's valent refers to an associate of its sense.

Notice, also, that the adjunct relationship between *cup* and *on* preserves part of the SSP, in that the semantic relationship is still one between the **sense** of the syntactic parent and the **referent** of the dependent. The parent is the **profile determinant** in the relationship (Langacker 1991, van Hoek 1995). In this way semantic structures are constructed in stages, each containing more specific semantic information, which often correspond to the phrasal nodes of a phrase structure analysis. This stepwise construction of semantic structure, **semantic phrasing**, is discussed in Hudson (1990: 146-151).

The lexical semantic properties of words also constrain the nature of the words that they can appear with. Words select the semantic properties of their valents (37), (38) and, in the case of adjuncts, of their parents (39), (40).[10]

(37) Donny/*the doorbell donated £500.
(38) *I ate the projection principle.
(39) Sally saw a pregnant cow/*bull.
(40) Sally saw the cook/*rat-poison who killed the cat.

The aspectual properties of verbs can also constrain the kinds of structure they can appear in. Vendler (1967) distinguishes three aspectual classes of verbs: **states**, **activities** and **events** (further classified into **achievements** and **accomplishments**), which are identified by their ability to appear in a range of constructions. For example, GIVE profiles an **achievement**, in Vendler's terms, as can be seen from the examples in (41), which contrast with those in (42).

[10] I use the * notation for all kinds of infelicity. Since semantic, syntactic and other linguistic information is encoded in the same formal network, there is no clear way of distinguishing unsemantic from unsyntactic or otherwise ungrammatical sentences. For example, *John wants cycling* can be construed as syntactically anomalous, since the complement of *want* should be *to*, or as semantically anomalous, since it means that John needs to be cycled (cf *John's bike wants cleaning*).

(41) a. Gaby gave her a bunch of flowers at midnight.

b. Gaby is giving her a bunch of flowers. [future reference]

c. Gaby gave her a bunch of flowers for five minutes. [duration of result, not event]

d. ?*Gaby gave her the flowers in five minutes.

(42) a. *Barry basked at midnight.

b. Barry is basking. [present reference]

c. Barry basked for five minutes. [duration of event]

d. ?*Barry basked in five minutes.

These examples, and their significance, are discussed at greater length below (2.2.1.3, 3.1, 4.1). For now it is enough to say that the proposed presence of a result in the semantic structure associated with Giving is the defining feature of **telicity**, which is a property of achievements. Elsewhere (4.1.2) I show in more detail how the presence of a result causes the behaviour seen in (41), but a brief summary can be given here: the punctual time expression in the (a) examples specifies the time of an event, of the Giving in this case, and for this reason it cannot be used with verbs (like BASK) that profile activities, since activities do not have punctual profiles; the present progressive is used to refer to currently true states (as in (42)b), which in the case of eventive verbs usually means it must refer to a state of being about to happen, or scheduled to happen, as in (41)b; FOR can be used to refer to a duration, a property of a state, which in the case of telic verbs must be the state resulting from the event profiled by the verb as in (41)c; finally, IN, as used in the (d) examples, profiles a relationship between two times, generally the time of initiating an action and that of successfully concluding it, which means that it is really only suitable with verbs that can profile accomplishments (which differ from achievements in that the action and its result have different times); when used with verbs profiling activities or achievements, to the extent that this is possible, this IN usually refers to the relationship between some reference point and the initiation of the action (what Croft calls "run-up achievements" (1998b: 76)).

The above discussion has given a flavour of the structure of the semantic network, and shown how its properties can affect the syntactic (combinatorial)

behaviour of words. In the following section I look at the relationships that define syntactic structure and at the semantic structures that correspond with them. I consider, among other things, the extent to which certain valency relationships can be considered lexical properties of individual words.

1.2.3.3 Dependencies

Figure 14 shows some of the syntactic and semantic structure that needs to be associated lexically with GIVE: the verb has a subject (s in the diagram), an object (o in the diagram) and an indirect object (io in the diagram), all of which are nouns. The sense of the verb, Giving, is an event with an er (the referent of the subject), an ee (the referent of the object), a recipient (the referent of the indirect object) and a result, an example of Having which shares its arguments with its parent. The giver has agentive control over the event, being in possession of the givee beforehand and willing the transfer of possession. The givee and the recipient are more passive participants: the former undergoes a change of possession, but nothing else, the latter simply takes possession of the givee. Being a haver presupposes other properties (centrally humanity), but those are not shown here.

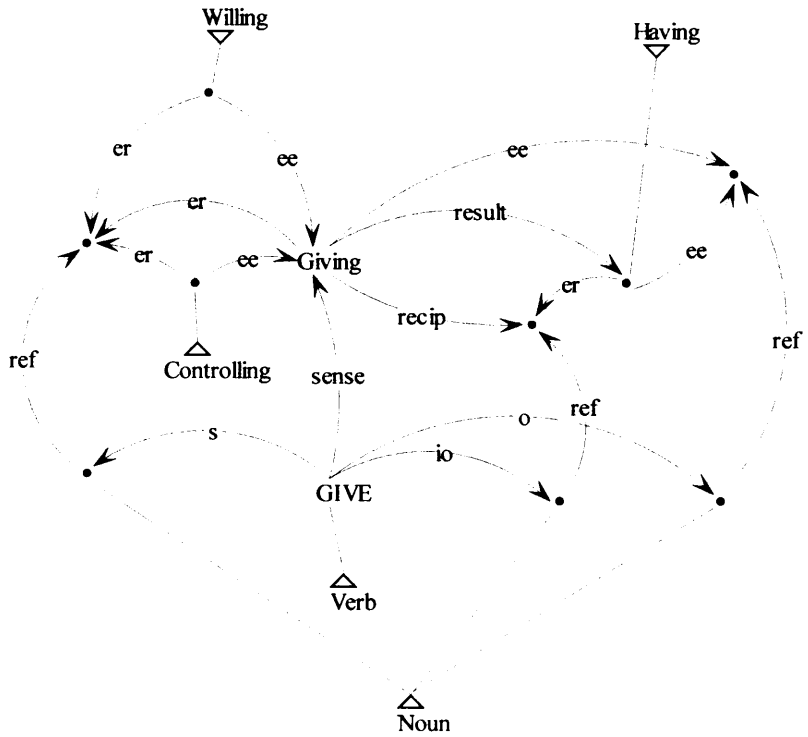


Figure 14 GIVE.

Clearly, not all this information is specific to GIVE. Volitional involvement, control and instigation are semantic properties associated with many other subject relationships, even those of verbs that have no (indirect) objects; the passive role and affectedness of the object also apply in many other cases; and many other verbs can appear with indirect objects, with similar semantic properties. Levin provides the following two groups of verbs permitting indirect objects (1993: 45-49), distinguished from each other by semantic properties (those in (43) alternate, according to Levin's analysis, with constructions with the preposition TO, those in (44) with constructions with FOR).[11]

(43) ADVANCE, ALLOCATE, ALLOT, ASK, ASSIGN, AWARD, BARGE, BASH, BAT, BEQUEATH, BOUNCE, BRING, BUNT, BUS, CABLE, CARRY, CART, CATAPULT, CEDE, CHUCK, CITE, CONCEDE, DRAG, DRIVE, E-MAIL, EXTEND, FAX, FEED, FERRY, FLICK, FLING, FLIP, FLOAT, FLY, FORWARD, GIVE, GRANT, GUARANTEE, HAND, HAUL, HEAVE, HEFT, HIT, HOIST, HURL, ISSUE, KICK, LEASE, LEAVE, LEND, LOAN, LOB, LUG, MAIL, MODEM, NETMAIL, OFFER, OWE, PASS, PAY, PEDDLE, PHONE, PITCH, POSE, POST, PREACH, PROMISE, PULL, PUNT, PUSH, QUOTE, RADIO, READ, REFUND, RELAY, RENDER, RENT, REPAY, ROLL, ROW, SATELLITE, SCHLEP, SELL, SEMAPHORE, SEND, SERVE, SHIP, SHOOT, SHOVE, SHOW, SHUTTLE, SIGN, SIGNAL, SLAM, SLAP, SLIDE, SLING, SLIP, SMUGGLE, SNEAK, TAKE, TEACH, TELECAST, TELEGRAPH, TELEPHONE, TELEX, TELL, THROW, TIP, TOSS, TOTE, TOW, TRADE, TRUCK, TUG, VOTE, WHEEL, WILL, WIRE, WIRELESS, WRITE, YIELD.

(44) ARRANGE, ASSEMBLE, BAKE, BLEND, BLOW, BOIL, BOOK, BREW, BUILD, BUY, CALL, CARVE, CASH, CAST, CATCH, CHARTER, CHISEL, CHOOSE, CHURN, CLEAN, CLEAR, COMPILE, COOK, CROCHET, CUT, DANCE, DESIGN, DEVELOP, DIG, DRAW, EARN, EMBROIDER, FASHION, FETCH, FIND, FIX, FOLD, FORGE, FRY, GAIN, GATHER, GET, GRILL, GRIND, GROW, HACK, HAMMER, HARDBOIL, HATCH, HIRE, HUM, IRON, KEEP, KNIT, LEASE, LEAVE, LIGHT, MAKE, MINT, MIX, MOLD, ORDER, PAINT, PHONE, PICK, PLAY, PLUCK, POACH, POUND, POUR, PREPARE, PROCURE, PULL, REACH, RECITE, RENT, RESERVE, ROAST, ROLL, RUN, SAVE, SCRAMBLE, SCULPT,

[11] The question of alternation, as well as the difference between the two groups, is dealt with shortly.

SECURE, SET, SEW, SHAPE, SHOOT, SING, SLAUGHTER, SOFTBOIL, SPIN, STEAL, STITCH, TOAST, TOSS, VOTE, WASH, WEAVE, WHISTLE, WHITTLE, WIN, WRITE.

The set of verbs that can take an indirect object, of either kind, is in principle unlimited in size, since it is possible to extend it in one of two ways. First, membership is open to new verbs which refer to appropriate activities:

(45) We radioed/phoned/faxed/emailed/texted/SMSed them the news.
(46) We posted/mailed/couriered/FedExed™ them the manuscript.
(47) Boil/coddle/microwave/Breville™ me an egg.

Second, and even more tellingly, existing verbs can be used with indirect objects, with novel meanings contributed by the semantics of the indirect object:

(48) The colonel waggled her his bid with his ears.
(49) Dust me the chops with flour.

Examples like (48) and (49) are acceptable to the extent that the actions they profile can be construed as having the appropriate semantic properties. For example a bottle of beer can be construed as having been prepared for someone if it has been opened for them to drink from, but a door is not construed as prepared when it has been opened for someone to pass through:

(50) Open me a bottle of pils/*the door.

It is clear from this, and from the fact, noted by Levin (ibid: 4-5) with respect to the middle construction, that speakers make robust judgments about the meanings of unfamiliar verbs in constructions on the basis of the construction's meaning (see also (51)), that the meaning of the construction must be represented in a schematic form in the mind of the language user.

(51) Flense me a whale.

This schematic representation must pair the semantic properties of the construction with its syntactic and formal (phonological/graphological) properties. Goldberg (2002) provides a powerful further argument for treating constructions as symbolic units in this way. This argument, which she traces to Chomsky (1970) and to Williams (1991) (where it is called the "target syntax argument"), holds that where the properties of supposedly derived structures (here the creative indirect objects) match those of non-derived ones (here the lexically selected indirect objects), the generalisation over the two sorts of structure is most effectively treated as an argument structure construction in its own right.

In English, which does not have a rich inflectional morphology, the formal properties of the indirect object relationship are limited to the fact that personal pronouns in the indirect object position appear in their default form (see Figure 2 above), which is also true of direct objects. Other languages show more variation, marking the presence of an indirect object in the form of the verb, as in (52) from Indonesian (Shibatani 1996: 171), or assigning different case to nouns in indirect object position than those functioning as direct objects, as in German (53).

(52) Suya membunuh-kan Ana lipas.
I kill BEN [name] centipede
I killed a centipede for Ana.

(53) a. Gib ihr/*sieBlumen.
give her flowers
Give her flowers.
b. Küβ *ihr/sie.
kiss her
Kiss her.

Some syntactic properties of the indirect object (in English) are given by Hudson (1992). These include the possibility of merger with subject in passive constructions (54), the obligatoriness of direct objects in indirect object constructions (55) and its position immediately following the verb (56).

(54) She was given some flowers.

(55) We gave (her) *(some flowers).

(56) a. We gave her some flowers/*some flowers her.

b. We sent her some flowers over/her over some flowers/*some flowers her over/*over her some flowers.

The semantic property common to all indirect objects is that they refer to havers: in the case of the verbs taking 'dative' indirect objects in (43), the result of the verb's sense is that the referent of the indirect object comes into possession of something; in the case of those taking 'benefactive' indirect objects in (44), the verb profiles an act of creating or preparing something intended to be given to the referent of the indirect object.

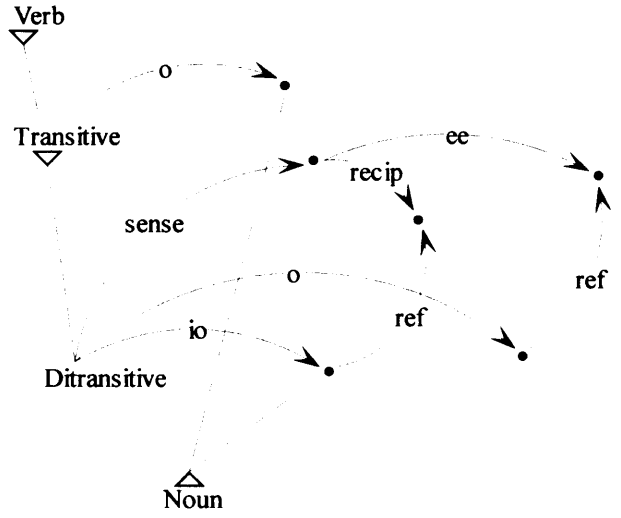


Figure 15 Some verbs have indirect objects.

Figure 15 shows the various properties associated with indirect objects. First, the diagram shows that indirect objects are nouns, and that it is verbs, and more particularly verbs with objects, that have indirect objects: Ditransitive, the category of verbs with indirect objects, isa Transitive, the category of verbs with direct objects. This is enough by itself to represent the fact that the direct object is obligatory with indirect objects (55), but the object relationship is nevertheless also shown in the ditransitive structure, since it appears in the word order rule (indirect objects precede objects). The referent of the object also appears in the semantic structure, along with

that of the indirect object, since without it the semantic structure can not be interpreted. I show the two referents as coarguments of the result of the verb's sense, though the semantics is worked out more clearly in the discussion of Figure 16. The fact that indirect objects can merge with subjects in passive constructions is dealt with in the following section.

Indirect objects may have one of two slightly different semantic structures, each associated with a separate category of ditransitive verbs. In both, the referents of the two dependents are er and ee of a Having, but the role of that Having differs somewhat between the two. The two structures are given in Figure 16.

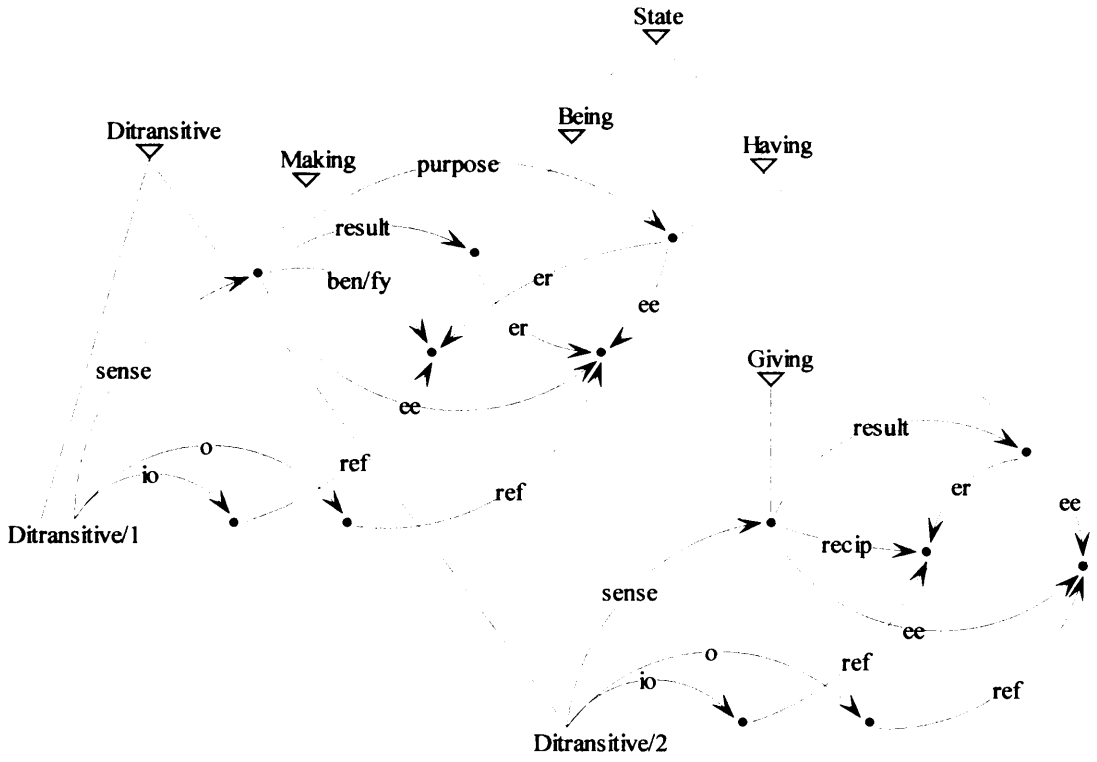


Figure 16 Two kinds of indirect object.

Ditransitive/1 is exemplified in (57):

(57) We baked her a cake.

The sense of the verb isa Making, and its result (therefore) isa Being (is a state) and the argument of that Being is the referent of the direct object: baking a cake results in that cake's existence, baking a potato results in that potato's being ready. The Having that

connects the referents of the two arguments is the purpose of the verb's sense: the purpose of the baking of the cake is that it should belong to her (the referent of the indirect object). This concept is connected to the sense of the verb by the beneficiary relationship (labelled ben/fy). Ditransitive/2 (58) has as its sense a Giving event, which straightforwardly has as its result the Having that connects the referents of the two arguments. The referent of the indirect object is connected to the sense of the verb by the recipient relationship.

(58) We passed her a parcel.

Once these two semantic structures are established, they can be used in the treatment of the relationship between the indirect object construction and constructions with the prepositions TO and FOR. Simply, TO has the same sense as Ditransitive/2 and FOR the same as Ditransitive/1 (with some differences: see (59)). This synonymy can, though it need not, be treated as a chance occurrence: no explanation is necessary for the relationship between constructions with indirect objects and those with TO. The case of FOR and the difference seen in (59) certainly support the idea that the two constructions converge on a single meaning by chance, since the two meanings are in fact different. The use of the indirect object to refer to the beneficiary of an act of preparation is only possible where the prepared item is prepared so it can be owned (or consumed) by the beneficiary; this constraint does not apply to beneficiary FOR.

(59) a. Open a bottle of pils/the door for me.
b. Open me a bottle of pils/*the door.

The pattern in Figure 15 (and Figure 16) represents a symbolic relationship. Lexical structures include specifications of the meanings of individual lexemes and of classes of lexemes defined by common properties of all sorts. A lexeme has a form and a range of syntactic properties which identify the syntactic pole of the symbolic relationship; it also has a sense, which provides the connection to a range of semantic properties. Similarly, inflectional and other classes of lexemes share formal, syntactic and semantic properties. And similarly, syntactic dependencies are associated with a

range of formal and syntactic properties (chiefly constraints on the elements at either end of the dependency) and semantic properties (represented in the semantic relationship between the meanings of the two elements). Figure 17 shows, by way of an example, partial lexical structures for the lexeme OPEN, the inflectional category Past and the indirect object relationship.

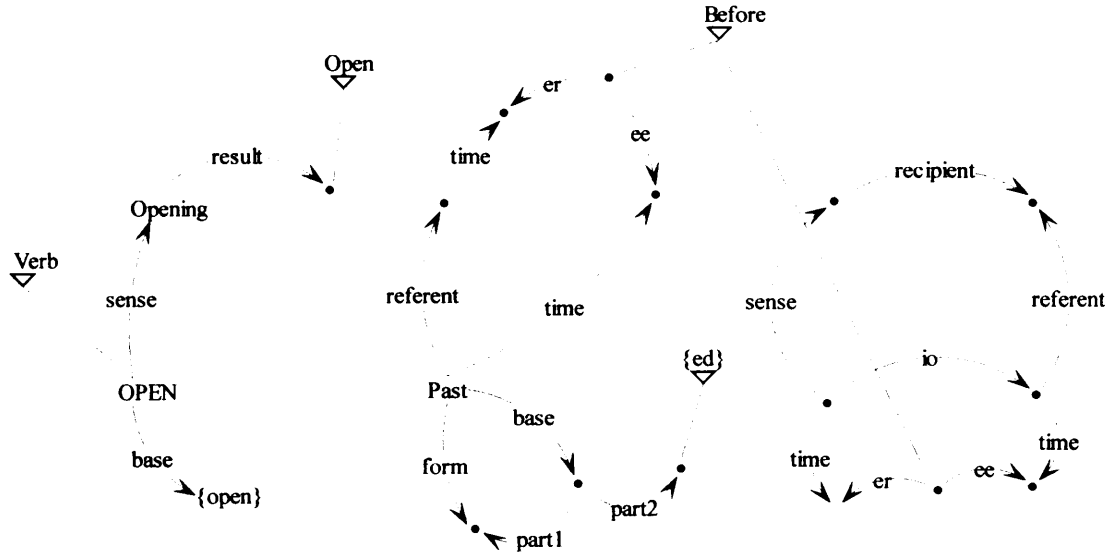


Figure 17 Schematic representation of OPEN, Past, indirect object.

The pattern in Figure 15 (and Figure 16) is a generalisation over verbs taking indirect objects. A verb appearing in a construction with an indirect object instantiates the more general model. The model represents the properties of the construction in the same way as a lexeme represents the properties of a particular word. In the case of a novel use of the construction (60), the fact that the sentence conforms to the formal properties entails that it also conforms to the semantic properties of the construction. In fact the construction can also be used to constrain the set of verbs that may take an indirect object, since only those verbs that can conform to the properties of the construction can appear in it: **Skate me a half-pipe*/**Run me a mile*, etc.

(60) Waggle me your bid.

Examples like (60) represent cases of multiple inheritance: the verb instantiates both WAGGLE (from which it gets its form and much of its meaning) and Ditransitive (from which it gets the indirect object and concomitant semantic properties). Notice

that this is the same mechanism that was introduced above for verbal inflection: the past tense of a verb inherits from the verb's lexeme and from the category Past at the same time.

Because of this possibility, it is not necessary to include all of the structure in the diagrams in the lexical specification even of a verb like GIVE, since (when it is used ditransitively) the relevant properties follow from the general properties of ditransitive verbs. These verbs, whose use with an indirect object seems unexceptional compared to those like (60), probably are lexically associated with the indirect object construction. GIVE, for example, might be separated into two sub-types, one of which isa Ditransitive, and the other of which takes TO as a complement. By contrast, a verb like ACCORD, that never appears without an indirect object, inherits all the properties of Ditransitive.

Figure 18 shows a part of the lexical structure of ACCORD and GIVE. All cases of ACCORD have indirect objects, so the whole category is subsumed under Ditransitive. GIVE, by contrast, is divided into two subcategories: one which isa Ditransitive, and one which isn't (this category has TO as a complement). The diagram also shows that creative use of the indirect object as in (60) can be mediated by a contextual (= non-lexical) specialisation of the relevant lexeme, that inherits also from the 'inflectional' category Ditransitive.

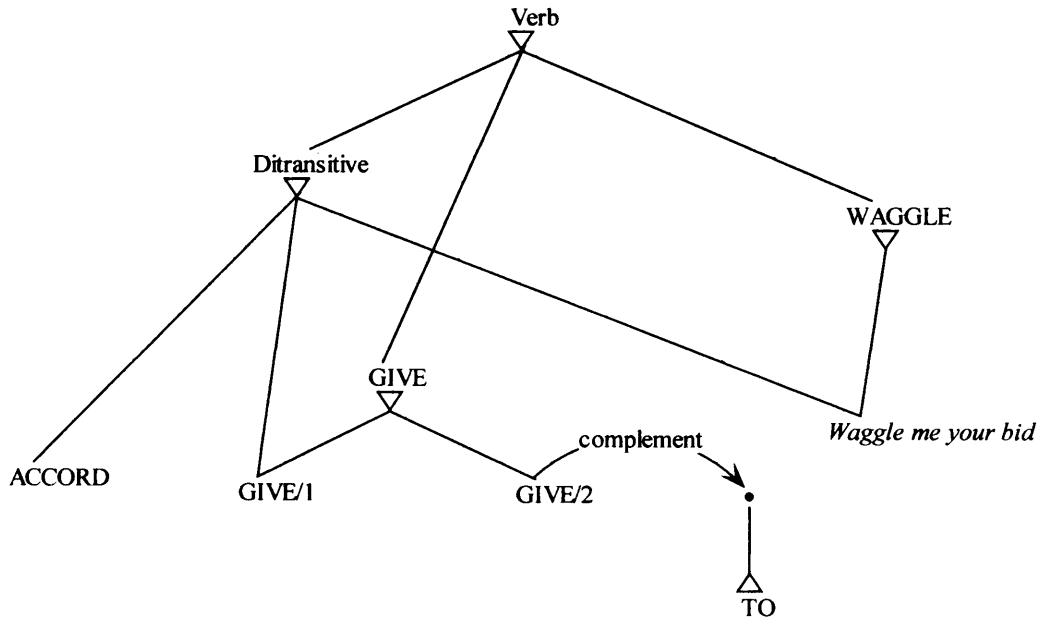


Figure 18 ACCORD, GIVE, *Waggle me your bid.*

Some of the features of the ditransitive model are nevertheless often repeated or overridden in the structures associated with verbs that are specialisations of it. For example, Lending and Loaning are special in that their result is temporary, Donating because the recipient is a charitable organisation, and Denying in that the intention is that the recipient should **not** receive the givee. These specialisations of/divergences from the model must be represented in the individual lexical structures of the verbs concerned.

A classification hierarchy consisting of classes defined by properties that distinguish them from other categories is a commonplace in many approaches to knowledge representation (and elsewhere). In linguistics the idea is found in the work of structuralist semanticists (see 2.2.1), among others.

The theory of lexical structure and linking outlined here is developed in greater depth in later sections. In the following section I make a case for exactly similar lexical constructional representations of the subject and object relationships. The lexical model for objects will include the formal and syntactic properties ({me} not {I}, is a noun, permits merger with subject, heavy NP shift, does not tolerate adverbs between it and its parent, can be extracted, etc) and the semantic ones (refers to the ee of the sense), and similarly for subjects. A fuller list of relevant properties for each dependent is worked out below.

1.2.4 Compositionality: sentence structures and lexical structures

1.2.4.1 Compositionality and coercion

The approach to linguistic analysis outlined here and used in the three data chapters is characterised in that it views linguistic structure as composed of words and classes of words and dependency relationships and classes of dependency relationships. Lexical structure, which exhaustively defines linguistic competence, consists of a (relatively) stable network of such words and relationships whose properties are defined at varying levels of generality.

The RSSP links syntactic valent relationships to semantic ones, as described above (1.2.3.2). The RSSP represents a specialisation of a more general principle, that words which are related syntactically are also related semantically. This principle and the fact that the semantic structures of words are fully integrated with the rest of

cognitive structure combine to provide a powerful analytical tool. For example, the preposition TO is often used in constructions profiling movement towards a destination (61), (62), (63). Generally, the parent of the preposition, be it a verb as in (61) and (62) or a noun as in (63), refers to the movement and its complement to the destination (in the broader sense of the term that includes recipients).

(61) The queen went to Queensland.
(62) I sent a letter to the queen.
(63) We enjoyed our trip to Queensland.
(64) A letter to the queen stood in the toast rack.
(65) An invitation to a garden party stood in the toast rack.

Note, however, that while (64) does not refer to a movement, the preposition clearly still profiles a destination. Furthermore, it clearly profiles the destination of the sense of the noun LETTER; indeed the preposition is selected (both semantically and syntactically) by the noun. In order for this to make sense, the semantic structure of the noun must include a destination (in the broader sense): *letter to the queen* means what it does **by virtue of the fact** that letters commonly have addressees, just as *invitation to a garden party* means what it does by virtue of the (slightly more 'purely linguistic') fact that people are commonly invited to go to parties.

The same mechanism can be applied to the phenomenon dealt with by Pustejovsky and Bouillon (1996) under the label **coercion**.

(66) Charlie started the cheese.
(67) Bertie started the book.

The difference in the meanings of the verbs in (66) and (67) derives from properties of the referents of their objects: cheeses are typically eaten and books read (or, less commonly, written).

Perhaps more significantly, the RSSP and specialisations of it are what control composition and linking in WG linguistic structures. The linking rule for indirect objects given in Figure 16 above, which is a generalisation over dependencies with

particular properties, also amounts to a specialisation of the RSSP: the indirect object of a verb refers to the recipient of its sense. Similar regularities govern the composition of structures with prepositions like those discussed above ((61)-(65)), and others govern the linking of subject and object relationships. These, the lexical structures of the subject and object relationships, gather together their syntactic and semantic properties in the same way as the lexical structure of the indirect object relationship gathers together the syntactic and semantic properties of indirect objects.

1.2.4.2 Objects

Biber et al. (1999: 126-128) give a number of syntactic properties for English objects, as follows:[12]

a. found with transitive verbs only
b. is characteristically an NP, but may be a nominal clause
c. is in accusative case (when a pronoun)
d. typically follows immediately after the VP (though there may be an intervening indirect object)[13]
e. may correspond to the subject in passive paraphrases

- The first two syntactic properties refer to the classes of the words at either end of the object relationship: some verbs (the transitive verbs) lexically select an object; the objects themselves are generally nouns.
- The third property concerns the form of the object: when it is a pronoun, it takes the 'accusative' form (what I have above called the default form).
- The fourth property concerns its relative position in the sentence: objects generally follow their parents, and only a limited set of other dependents of the parent may intervene (any number of predependents of the object may intervene) (68). Biber

[12] The properties in this section are used as the defining properties of objects, and a WG account is sketched that shows how these properties are associated with the object relationship. It may be felt that objects have other properties that are not represented here, or that one or other of the properties is incorrectly ascribed to objects. In a sense this does not matter, since the present section is concerned with providing a model for the WG characterisation of linguistic structure. The full range of properties of objects is explored in other parts of the thesis.

[13] Note that in Biber et al. the VP category subsumes the 'verbal complex' (main verb and any auxiliaries), but not any complements or other postdependents of the verb.

et al. note that indirect objects may come between the object and the parent (69); this possibility is also open to particles (70).

(68) Philly filleted (*skilfully) the fish.
(69) We gave her a new knife.
(70) She threw away the old one.

- The final syntactic property refers to passive constructions. Under the WG analysis (see Hudson 1990: 336-353), the subject of a passive verb is at the same time its object (71) (or indirect object (72)), the merger of dependents being licensed by the passive construction itself.

(71) The camel hair coat was given to Cathy.
(72) Cathy was given the camel hair coat.

Figure 19 shows how these syntactic properties can be represented in a lexical structure.

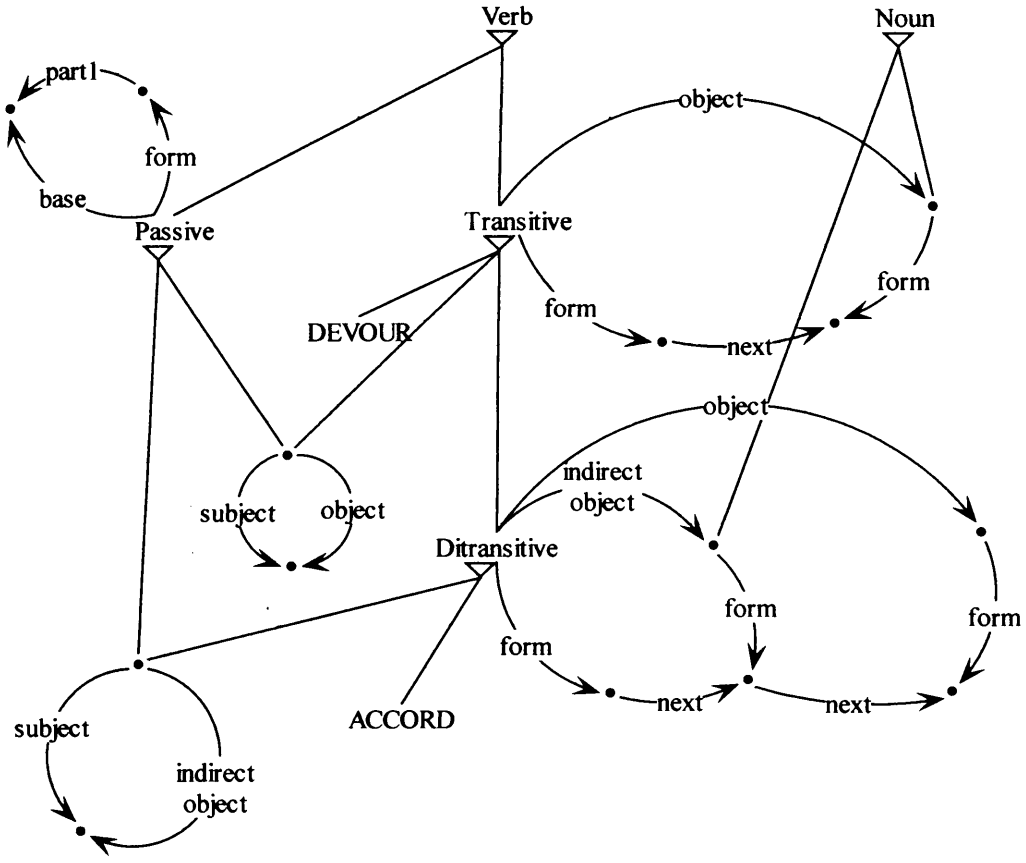


Figure 19 Syntactic properties of objects.

The parent in an object relationship isa Verb and the dependent isa Noun. In this way, the object relationship defines a class of transitive verbs (verbs that have objects).[14] Verbs that only appear in transitive constructions inherit all properties from this class (DEVOUR isa Transitive, just as ACCORD isa Ditransitive). The word order properties are represented by the **next** relationship: the form of the dependent is the next of that of the parent. The diagram also shows the category Ditransitive (see Figure 16), where the word order properties are somewhat different (the form of the object is the next of that of the indirect object). Also represented in the diagram is the class of passive verbs (the category Passive). These verbs are defined by their formal properties: the form of a passive verb consists of its base plus a suitable ending (not shown). There are two classes of passive verb: one, which also isa Transitive, in which the subject is merged

[14] Indeed it also defines a class of nouns that are objects. Just as DINE cannot be a transitive verb, so I cannot be an object.

with the object, and one, which also isa Ditransitive, in which the subject is merged with the indirect object.

The full lexical structure of the object relationship must also include its semantic properties. In line with the approach outlined above for indirect objects, the semantic properties of the object are related to its syntax through a specialisation of the RSSP. Biber et al. (1999: 126-128) also identify a range of possible semantic relationships that correspond with the object relationship (see a-g), and the lexical semantic representation of the object relationship should be general over all of these.

a. affected (*bake a potato*)
b. resultant (*bake a cake*)
c. locative (*swim the Ohio*)
d. instrumental (*kick your feet*)
e. measure (*weigh 100 tons*)
f. cognate object (*laugh a sincere laugh*)
g. eventive (*have a snooze*)

Properties a, b and d can be quite straightforwardly collected under a general treatment, in terms of their force-dynamic properties: in each case, the sense of the verb has a result which is a further event having the referent of the object as an argument (when you bake a potato, the potato becomes soft and edible; when you bake a cake, the cake comes into existence; when you kick your feet, the feet move). This is represented in Figure 20: a verb's object refers to the er of the result of the verb's sense. This two-stage relationship is further represented in a direct relationship between the verb's sense and the referent of its object, labelled ee.

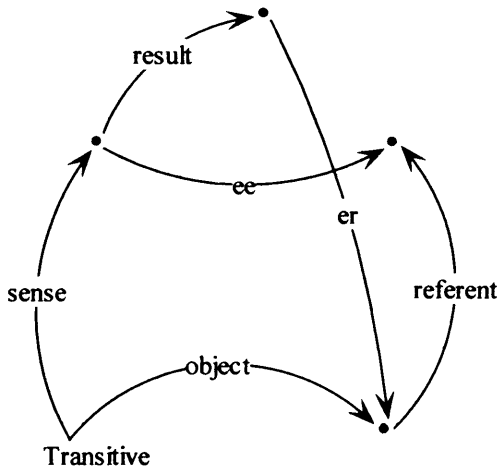


Figure 20 Affected/effected objects.

Notice that a similar conflation of a two-stage relationship into a direct one was used above in the semantic structure of indirect objects. In fact, when a verb has an indirect object, the recipient relationship overrides the ee relationship in being assigned to the er of the result, in much the same way as the word order properties of the indirect object override those of the object. This is determined in the semantics by the nature of the resulting state: where this state isa Being, its er is the ee of the verb's sense; where it isa Having, its er is the recipient of the verb's sense, rather than its ee, and the ee of the verb's sense is the same as the ee of the result (see Figure 16 above; also chapter 3).

'Locational' objects, as in c, do not refer to affected arguments, but to parts of a path. The example in c defines the beginning and end of the path (on opposite sides of the river), but other examples may profile the beginning ((73)a), middle ((73)b) or end ((73)c) of the path.

(73) a. The express jumped the rails. (from Biber et al. (ibid: 127))

b. Vinny vaulted the horse.

c. Elly entered the room.

The set of verbs that can appear with an object of this kind is (naturally) limited to those that can refer to a motion event and in this sense the 'locative' object is lexically selected by its parent. Notice also that the verb (often) determines which part or parts

of the path may be profiled by such an object. Because of this, these arguments must appear in the lexical structures of quite specific categories (at the level of the lexeme or just above). The relevant categories are subsumed under Transitive, since the syntactic properties are the same as those of the affected/effected objects, but it is arguable whether they need to be collected under a category 'locative object verb'. This category is justified to the extent that generalisations can be made over the relevant constructions.

There seems to be little semantically in common between locative objects and affected/effected objects, though there is some relationship. For example, Dowty's (1991) **incremental theme** is a property of both kinds of object: the event in both cases is bounded by the theme:[15]

(74) a. Barry baked a potato/*potatoes in five minutes.
b. Sammy swam the Ohio/*rivers in five minutes.

When the sense of the verb is an unbounded event, a measure expression can be used to define a bounded path: *Sammy swam five miles.* It is not entirely clear that arguments of this sort are indeed objects. Some certainly are not; in (75) the object of *pushed* is *the (pea)* and not the measure expression.

(75) Evans pushed the pea five miles with his nose.

The 'measure' objects are also confined to a limited class of verbs, by which they are semantically selected (*weigh five tons*, *measure five furlongs*). They also have little in common semantically with the other types of object, since their semantics is so heavily constrained by the verb.

'Cognate' objects ((76), (77)) are also associated with a very small class of verbs (Levin gives 47 (1993: 95-96), out of a total of 3107 verbs). They have something in common semantically with effected objects, but the semantics is

[15] The relationship between the boundedness of the event (telicity) and temporal IN is discussed above (1.2.3.2) and below (3.2.2, 4.1.2).

constrained by the verb, which may also go so far as to select a particular lexeme. Levin notes:

> "Most verbs that take cognate objects do not take a wide range of objects. Often they only permit a cognate object, although some verbs will take as object anything that is a hyponym of a cognate object." (1991: 96)

The verb and its object refer jointly to a performance of some kind.

(76) She sang a sweet song.

(77) Deirdre died a slow and painful death.

'Eventive' objects are confined to an even smaller class, the 'light' verbs. In these cases the event structure is determined by the verb, but the details of the semantics are supplied by the noun. In light verb constructions with HAVE, the object refers to an event (*have a bath/meal/billiards match*); light DO, in contrast, refers to an affective/effective event, the precise nature of which is determined by the semantics of the (affected) object:

(78) a. I'll do the beds. ['dig them/make them up']

b. I'll do the potatoes. ['peel them']

c. I'll do the cake. ['bake it']

Figure 21 collects together the various semantic properties of objects. The category Transitive is the same as appeared in Figure 19: it is the locus of the syntactic properties of objects (these are represented schematically here).

- The majority of objects are subsumed under the affective/effective category. In the diagram this is represented by the semantic concept Making.
- I show two subcategories. Making' (as in *The cold made our lips blue*) and Creating are schematic for the senses of the affective object verbs and the effective object verbs respectively.
- Making is schematic for all affective/effective events, and as such provides a sense for 'light' DO (shown as DO/LIGHT in the diagram). 'Light' HAVE is shown as a simple transitive verb that corefers with its object (the shared referent being an event).

- The set of verbs taking 'locative' objects is represented by a class having Moving' as its sense. This concept, which is a subcategory of ordinary Moving, subsumes cases of moving with respect to some landmark. The landmark appears in the semantic structure (labelled lm).
- The types of Moving' are classified here according to whether the landmark is construed as the middle of a path (Passing), an obstacle (Traversing), an end point (Entering) or a source (Leaving).
- Finally, the diagram shows that some nouns which are objects refer to Measurements, and they define a property of the er of their parent's sense.

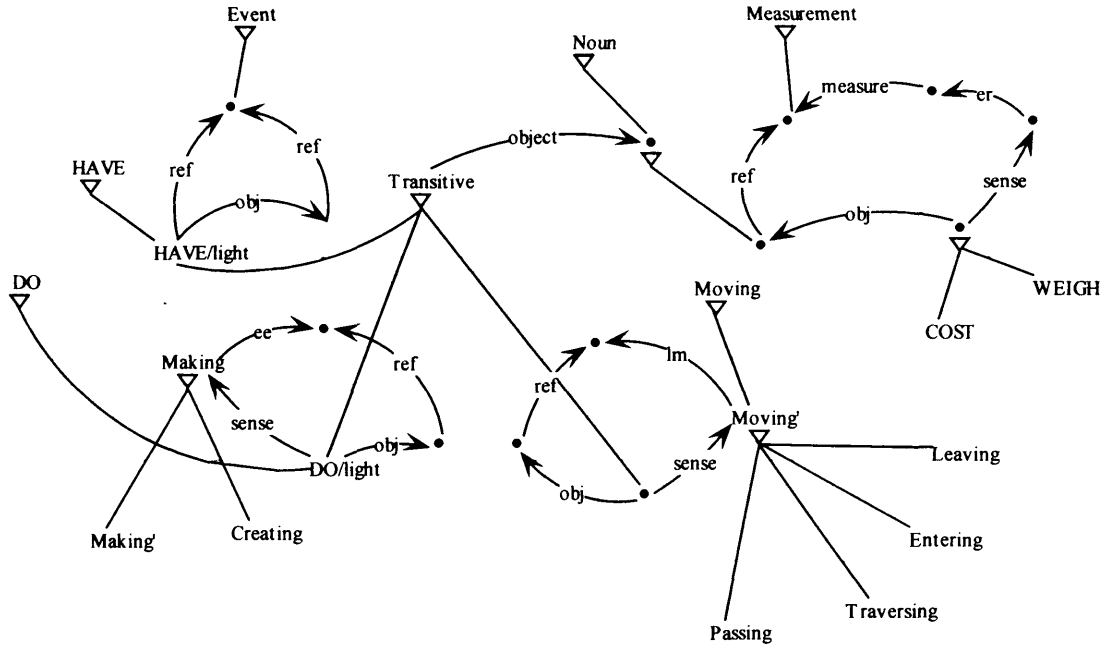


Figure 21 Semantic properties of objects.

The lexical structure given in Figure 21 integrates the syntactic properties identified above (Figure 19) with the semantic properties of the various types of object. Figure 21 is schematic for all 'transitive constructions' in that verbs with objects inherit (some of) their properties from the category Transitive (usually by way of one of the subclasses) and nouns that are objects inherit some of their properties from the category that fills the relevant slot in the structure (perhaps also by way of one of its subclasses: the diagram does not show inheritance relationships between the object noun in the most general case and those in the subcases, but these relationships are nevertheless implicit in the inheritance structure).

1.2.4.3 Subjects

Biber et al. (1999: 123-125) give a number of syntactic properties for English subjects, as follows:[16]

a. found with all types of verbs
b. is characteristically an NP, but may be a nominal clause
c. is in nominative case (when a pronoun and in a finite clause)
d. characteristically precedes the VP, except in questions where it follows, except where the subject is a Wh word itself
e. determines the form of present tense verbs (and of past tense BE)
f. may correspond to a *by* phrase in passive paraphrases

- Again, the first two syntactic properties concern the classes of words that participate in the relationship: verbs have subjects, which are generally nouns. Any verb may have a subject, so the class of 'subject verbs' is less constrained than the class of transitive verbs. It is perhaps for this reason that the semantic roles played by subjects are so much more diverse (see below). All tensed verbs have subjects, so the class Tensed is shown as a subset of the subject verbs. (see Figure 22.)
- The 'nominative' form of personal pronouns consists of the five words I, SHE, HE, WE and THEY, which are subcases of the relevant pronouns that are used only in subject position, as outlined above. (see Figure 22.)

[16] The comments in note 12 apply, mutatis mutandis, here too.

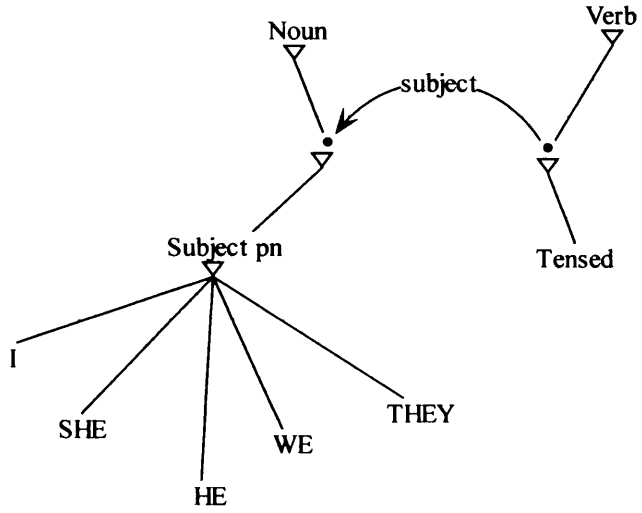


Figure 22 Some syntactic properties of subjects.

- The word order properties of subjects are slightly more complicated. Generally the subject precedes its parent, but some subjects follow their parents and in many of these cases the referent of the verb is questioned (the construction forms a yes/no question); these cases are represented in the subclass of subject verbs Inverted. The word order properties of Wh questions are determined in part by the lexical properties of the category Wh (schematic over Wh words). This category is always the extractee (x< in the diagram) of its parent and so precedes it. Where the Wh word is not the subject of the verb, the verb and subject are also inverted (the complement of Wh isa Inverted).

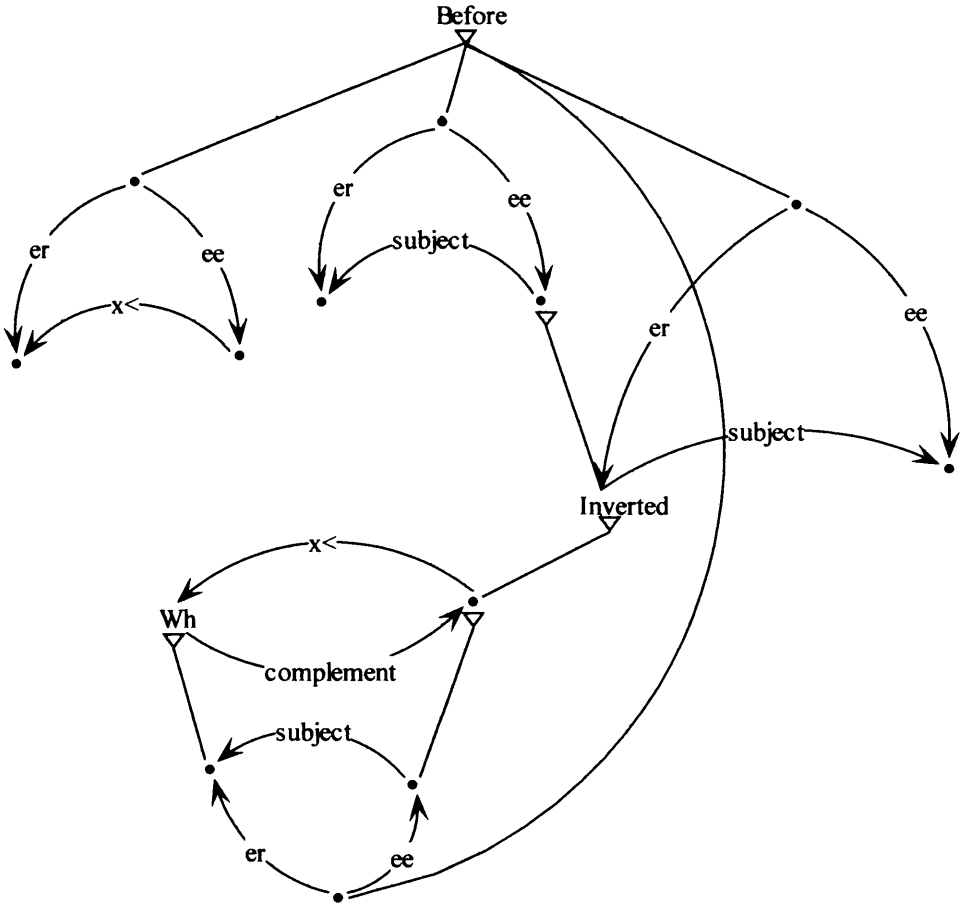


Figure 23 Word order properties of subjects.

- Subject-verb agreement is a property of the categories participating in the subject relationship. Present verbs (Present is a subcase of Tensed) must have the same agreement value as their subjects. Those with the agreement singular have a form consisting of their base plus an {s}. Notice that this requires that the pronouns I and YOU have agreement plural (or have no agreement value) (*I like/she likes*). Subject-verb agreement is dealt with at length by Hudson (1999).

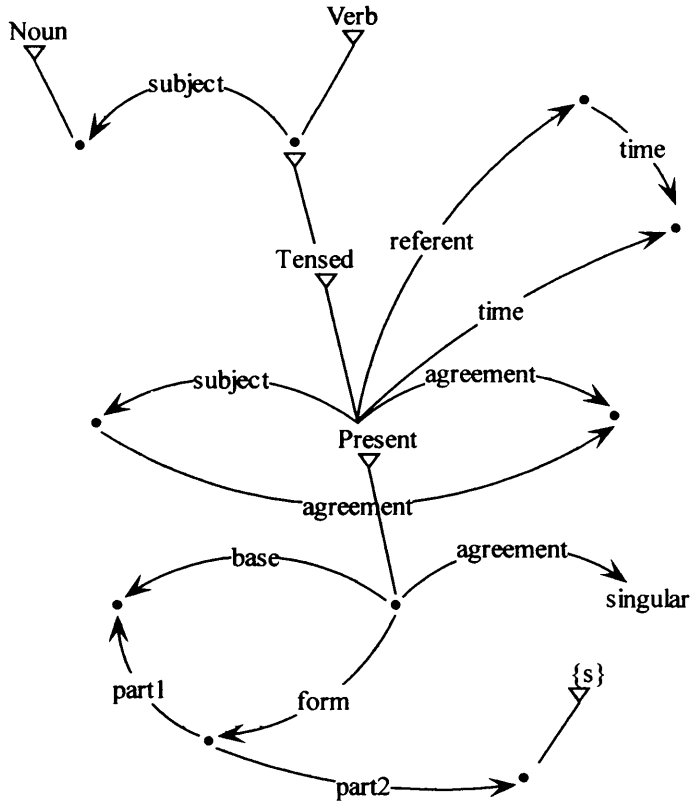


Figure 24 Subject-verb agreement.

- The final syntactic property is more properly semantic in WG: just as there is overlap between the semantics of the indirect object relationship and that of the preposition TO, so there is considerable overlap between the semantics of the subject relationship and that of the preposition BY.

The semantic properties of subjects are explored more fully in the following chapter (and in the three data chapters), but some general remarks can be made here. Biber et al (ibid: 123-125) give the following possible semantic roles for subjects:

a. agent/willful initiator (*She kicked a bottle cap at him*)
b. external causer (*The wind blew the plane off course*)
c. instrument (*Tactics can win you these games*)
d. with stative verbs:
   - recipient (*I know it, She could smell petrol*)
   - source (*You smell funny*)
   - positioner (*She sat against a wall*)

e. affected (*It broke, An escapee drowned*)
f. local (*The first floor contains sculptures*)
g. eventive (*A post mortem examination will take place*)
h. empty (*It rained*)

- The first three roles (a-c) can be collected together by virtue of the force-dynamic properties they share: agents, causes and instruments all precede the event in the force-dynamic chain.
- I argue below (3.1.4) that affected subjects (e) are similarly controlled by the force-dynamic structures of the verbs that take them.
- The semantic roles played by the subjects of stative verbs are chiefly determined by the lexical (semantic) structure of the individual lexeme, though some semantic classification is possible (see 3.1.4.3)
- 'Local' and 'eventive' subjects are controlled by the lexical structures of the verbs that take them.
- Since every verb can have a subject, the number of different semantic roles open to the referents of subjects is limited only by the number of different event types denoted by verbs. This can be seen particularly clearly in the case of 'dummy' subjects (h).

Figure 25 collects together the possible semantic roles associated with the subject relationship, and relates them symbolically to the syntactic properties identified above (given schematically in the diagram). The various semantic types of subject are glossed by the er relationship introduced above. A full account of this relationship and of the ee relationship linked with objects is provided in the following chapter. Four kinds of stative predicate are shown, covering the three possibilities under (d) and the 'local' subjects in (f). Some of these semantic classes are dealt with in more detail in following chapters; each makes different requirements of its er. A class of 'eventive verbs' is also included; these corefer with their subjects.

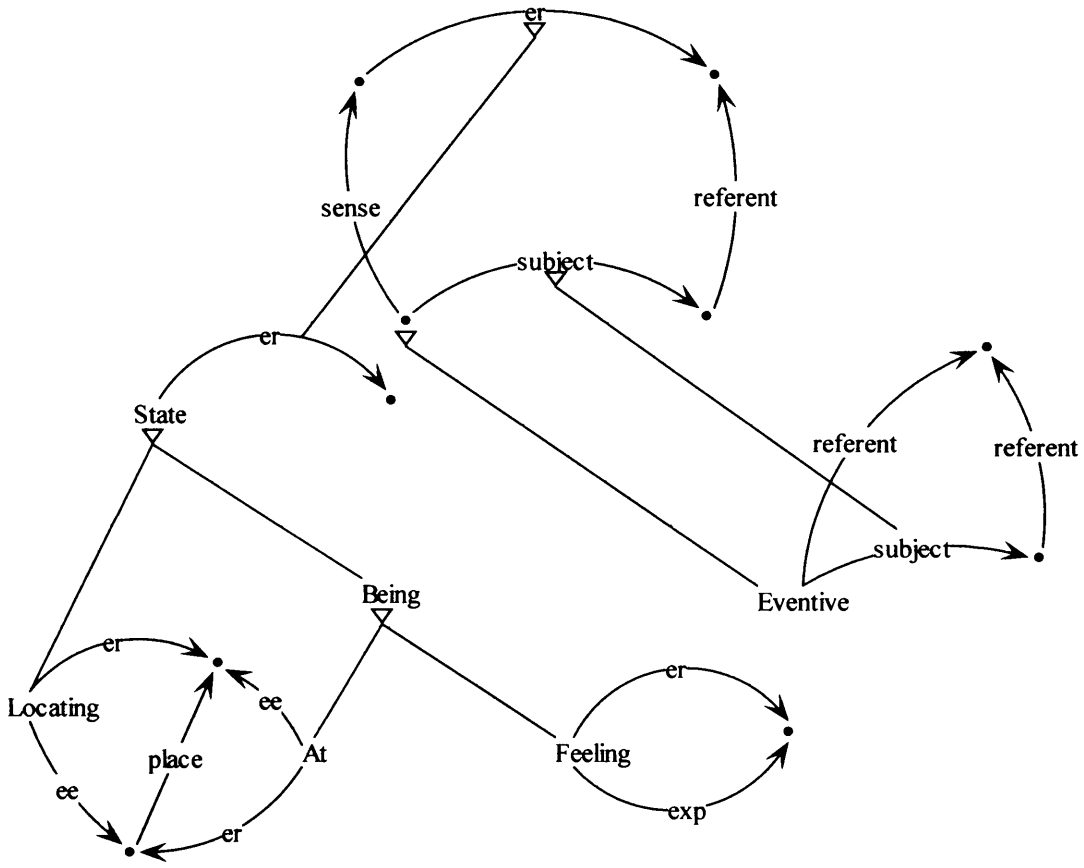


Figure 25 Semantic properties of subjects.

1.2.4.4 Summary

In this chapter I have outlined an approach to linguistic analysis whereby the grammatical structure of sentences is expressed in terms of the lexical requirements of the grammatical categories involved. These categories range from the highly specific (individual lexemes) to the highly general (word classes, properties common to all words); they are semantic (defined by aspects of their meaning), syntactic (defined by their relationships with other words in the sentence), lexical (defined by their relationships with other lexemes), formal (defined by properties of the word's pronunciation or spelling) or some combination of the above; they consist of classes of concepts and of classes of relationships between concepts (defined in terms of the properties of the concepts at either end).

In using this approach, the challenge of linguistic analysis is to identify the appropriate classes, and the ways in which they interact in grammatical structures. In

the three data chapters, the details of the WG approach are fleshed out in the areas of linking, aspect and ambiguity and the framework is applied to data from three overlapping areas of the lexicon: verbs of motion, resultative expressions and causatives and the causative alternation. In chapter 2 the WG approach is compared with some other approaches to lexical semantic analysis and some significant issues are identified. To conclude this chapter, I give a full analysis of the Levin (1993) data discussed above (1.1.3).

1.2.5 Those Levin examples again

	TOUCH	HIT	CUT	BREAK
conative	no	yes	yes	no
body-part possessor ascension	yes	yes	yes	no
middle	no	no	yes	yes

Table 2. Four verbs and three constructions.

Table 2 duplicates Table 1 from above. In 1.1.3 I give an informal account of the pattern in the table, identifying properties of the verbs and constructions that explain their compatibility or incompatibility with each other. In this section I briefly present specific lexical structures that include the properties adduced above (most of the lexical concepts and relationships introduced here are discussed at great length in the following chapters). I begin with the verbs:

➢ **TOUCH:**

At the heart of the lexical semantic structure of TOUCH is a state of being in contact. This is represented in the diagram by the concept Touching. It has two arguments, whose roles in the touching are, objectively, indistinguishable (the two alternatives in (79) are truth-conditionally identical; also TOUCH permits what Levin (1993: 36-37) calls "understood reciprocal object alternation" (80)). However, the verb's lexical structure imposes a distinction on them: one is accorded special prominence over the other (the sort of prominence that underlies Langacker's (1991) distinction between trajector and landmark); this distinction accounts for the contrast in (81).

(79) The anode must not touch the cathode./The cathode must not touch the anode.

(80) The anode and the cathode must not touch.

(81) You must not touch the screen./?The screen must not touch you.

In order to distinguish between the two arguments, I label one (the most prominent) er and the other ee. The arguments are further related to each other in that parts of each (parts of the surface of each) share a place. TOUCH can also be used to refer to an event resulting in this stative touching. This event appears in the diagram as Touching/r (r for resultative). Both Touching and Touching/r are shown in the diagram as the sense of the lexeme TOUCH. This issue is dealt with at great length in chapter 5 (5.2.3.3).

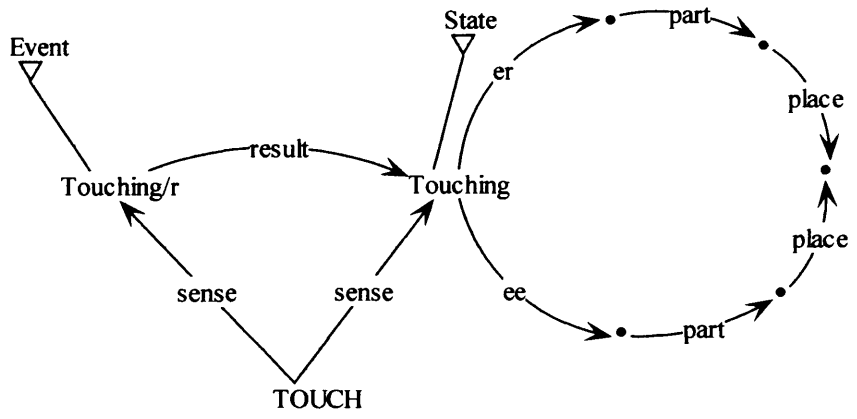


Figure 26 TOUCH.

➢ **HIT**

A state of being in contact also forms part of the semantic structure of HIT. It is the end result of the event profiled by the verb. Like TOUCH, HIT can be used with one of two senses: the primary cause of the touching event is a moving event where the toucher moves with the result that it touches the touchee (82); this event may be the result of a further event of instrumental hitting, labelled Hitting/i in the diagram (Figure 27), where the hitter acts on some other participant, causing it to move towards the touching event (83). The moving event has a path and a speed, which will both be significant in the later discussion (these, among many other details, are not shown).

(82) A bird hit the window.

(83) Ginger hit the cymbal (with a brush).

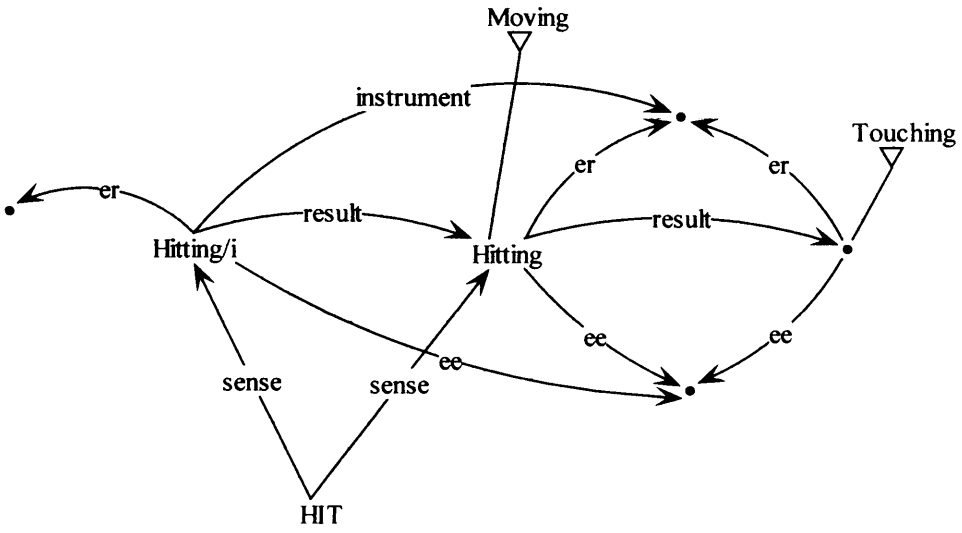


Figure 27 HIT.

➢ **CUT**

The lexical semantic structure of CUT includes a structure exactly similar to that in Figure 27. With CUT, however, there is an additional state, resulting from the Touching: a "separation in the material integrity" (Hale and Keyser 1987) of the cuttee. The instrument used in cutting must have an edge.

The sense of the verb in (84) is Cutting (an argument moves towards contact with another resulting in a separation in its material integrity); the sense of the verb in (85) is Cutting/i (an agent causes another argument to move towards contact with a third, resulting in a separation in its material integrity. (86) shows one reason why the moving event must have a path (this is the referent of the preposition).

(84) The axe cut the door in half.

(85) Jack cut the door in half (with an axe).

(86) The axe cut deep into the wood.

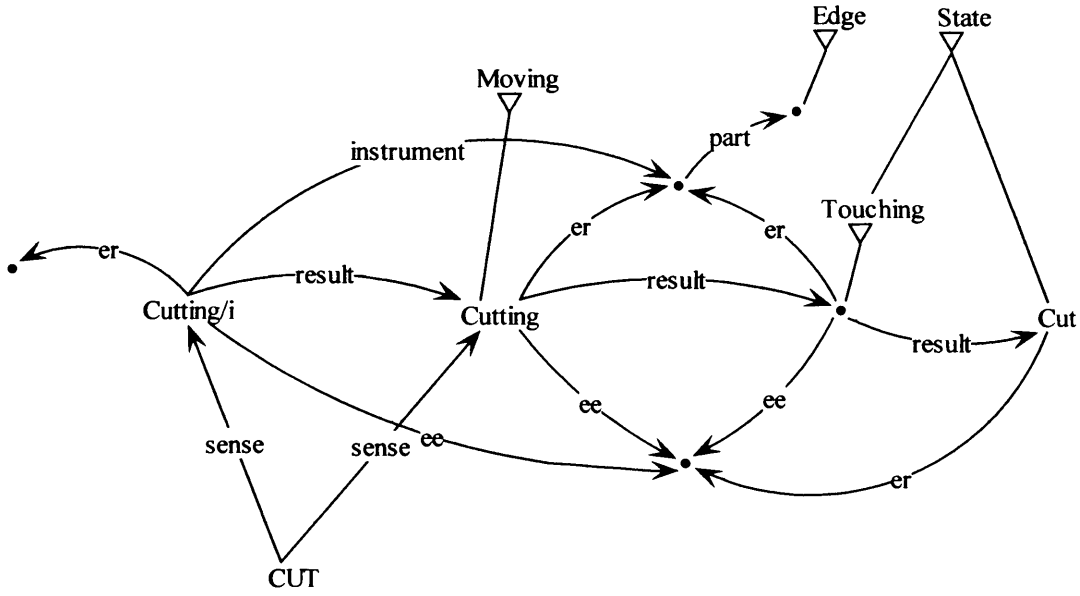


Figure 28 CUT.

➢ **BREAK**

The lexical semantic structure of BREAK includes two result relationships. These form a simple force-dynamic chain whereby the breaker acts on the breakee causing it to undergo a process resulting in its being broken. The case of BREAK is discussed at great length in chapter 5, with particular emphasis on the fact that the verb can be used to refer to either of these two events: the change in the affected argument itself, labelled Breaking/u (u for unaccusative), or the event causing it, labelled Breaking/c (c for causative). Breaking/c has an er and an ee; Breaking/u has just an er, which is also the argument of its result.

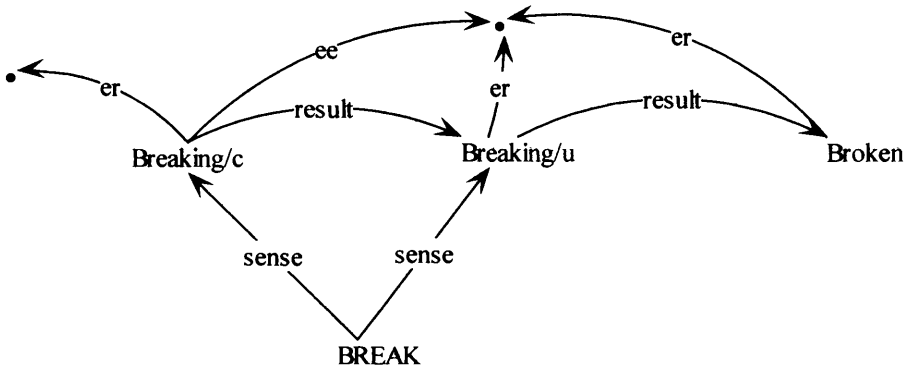


Figure 29 BREAK.

Next the constructions:

➢ **transitive**

The structures given for the four verbs above all support transitive uses. The structures assigned to the subject and object relationships above link them to the er and ee relationships respectively, so that the concepts in the lexical structures of the four verbs that have both these arguments are suitable to act as the sense of a transitive verb. The diagram shows a simplified structure for *Janet broke the vase*. Transitive constructions with the other verbs will be similar in structure.

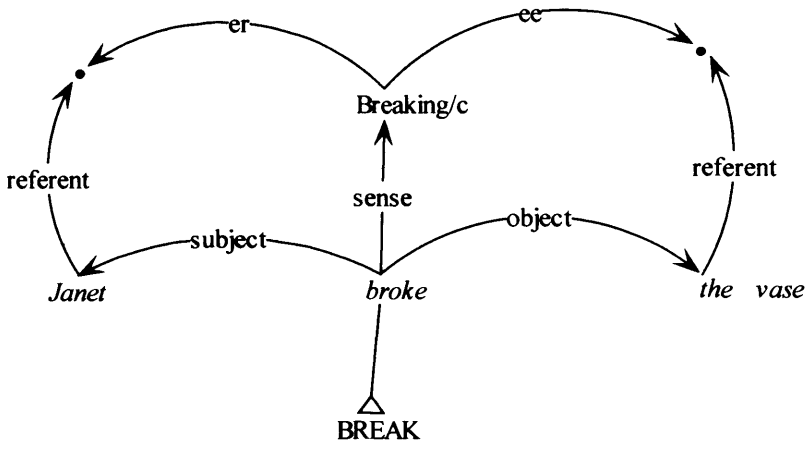


Figure 30 *Janet broke the vase.*

Janet is the subject of the verb, *the* its object. The referent of the subject is the er of the sense and that of the object is the ee of the sense. Since this requires the sense to have two arguments, the causative sense Breaking/c must be used.

➢ **conative**

The conative construction is structured by the lexical properties of the preposition AT. AT, as used in a sentence like *Carla threw a brick at Bill*, supplies the goal of its parent's sense (Figure 31 shows a partial representation).

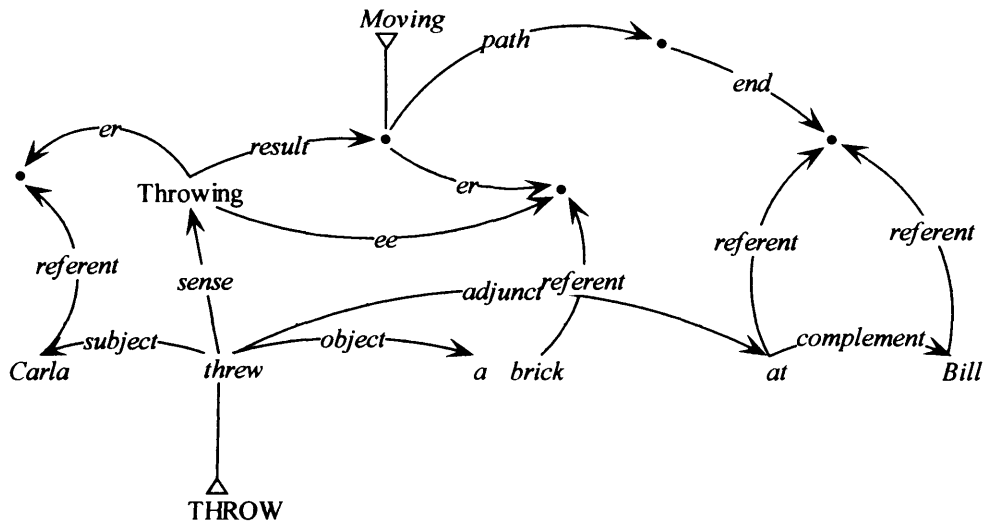


Figure 31 *Carla threw a brick at Bill.*

The relationship goal is a gloss for the end of a path. The parent of AT in this use must have suitable path in its lexical semantic structure. Figure 32 shows (some of) the structure of *Carla hit at the door.*

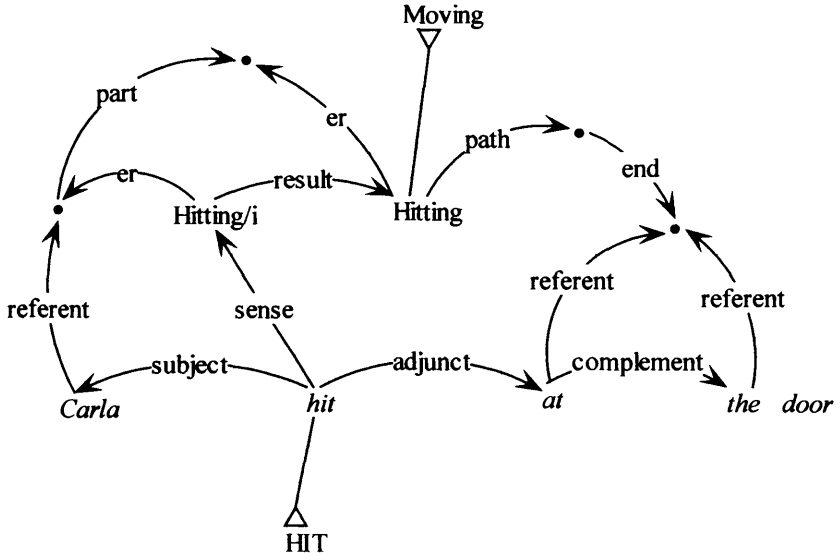


Figure 32 *Carla hit at the door.*

In conative constructions, the goal is construed as an intended effect: while the motion follows a path (roughly) directed towards the named end point, the final contact is explicitly cancelled (it is presumably for this reason that AT is used with LOOK, where no physical contact is possible). The structure of the construction requires that the

event profiled by the verb be one of motion along a path, and it is for this reason that it is incompatible with the lexical semantics of TOUCH and BREAK.

➢ **body-part possessor ascension (BPA)**

Just as the conative construction is structured by the lexical semantics of AT, so the BPA construction is structured by the lexical properties of the preposition ON. This is not to say that similar constructions are not possible with other prepositions:

(87) Peter poked Paul in the eye/between the shoulder blades/under the armpit.

The senses of spatial prepositions have two arguments, er and ee. The place of the er is the same as that of a part of the ee, the particular kind of part depending on the preposition. Figure 33 shows the structures of ON and IN. In the former case, the er is placed on the surface of the ee; in the latter, it is placed in the interior. The figure also shows that On is the converse of Supporting (if a is on b, b supports a) and In that of Containing.

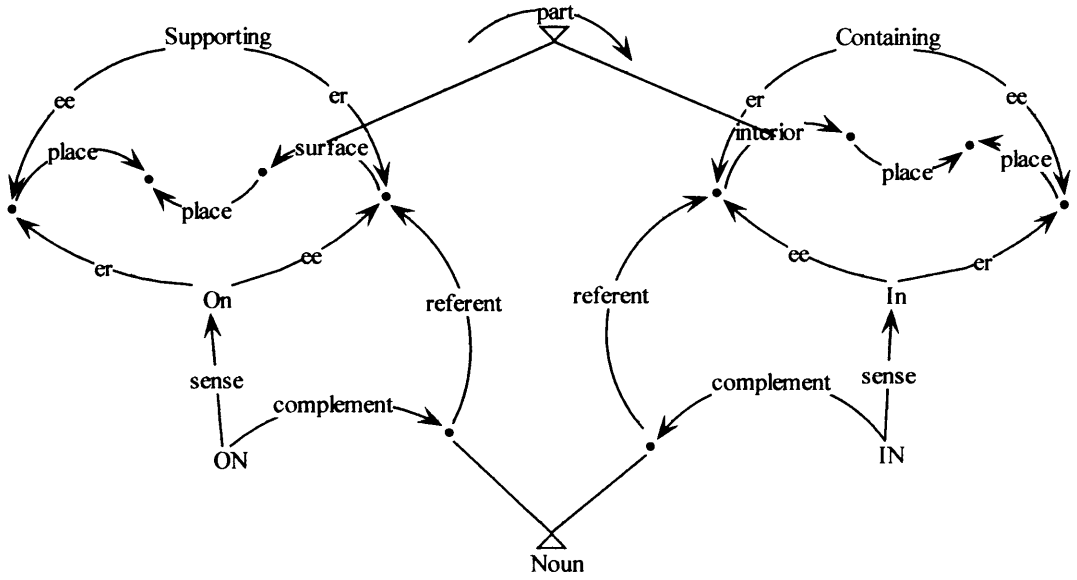


Figure 33 ON and IN.

Whether the preposition appears as the adjunct of a noun (*book on the shelf*), or of a verb (*sleep on the floor*), the parent's sense fills the er slot in the structure of the

preposition (when the preposition is a complement, the relationship between it and its parent is determined by the parent).

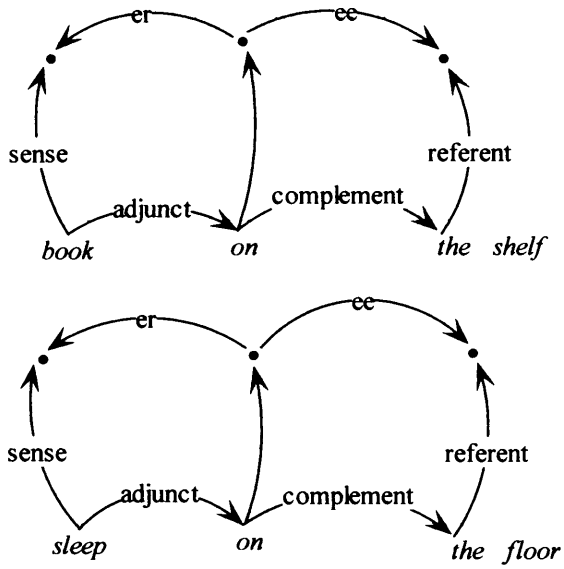


Figure 34 *book on the shelf* and *sleep on the floor.*

When the parent is a verb, the event that it profiles is the element that is located; however, it is usually inferred that any participants in that event are also located in the place specified. Note, though, that this is not guaranteed, but is dependent on the context: (88) is three ways ambiguous. In other constructions, where the verb is transitive and refers to a motion event, the preposition refers to the place that the referent of the object moves to (89).

(88) I saw you in the swimming pool.

(89) Peter poked his finger in the pie/between the bars/under the strap.

In BPA constructions, part of the semantics of the preposition is able to merge with the semantics of the verb. The complement of the preposition refers to a part of the ee of the verb's sense (the referent of the object); this part merges with the part role in the structure of Touching (Figure 26); because of the structure of On, a further part of this element (specifically its surface) defines the place of the Touching; because of the structure of Touching, it also defines the place of the relevant part of the toucher. Clearly this is only possible with verbs whose lexical semantic structure contains a

touching event and it is for this reason that BPA constructions are ruled out with BREAK.

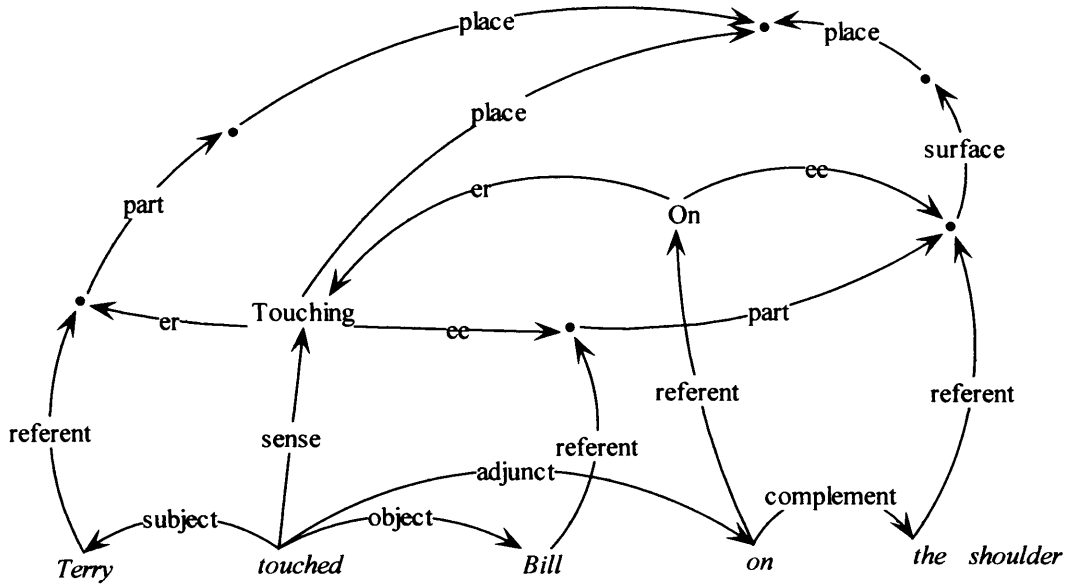


Figure 35 *Terry touched Bill on the shoulder.*

➢ **middle**

Middle constructions are structured by the inflectional category Middle, as shown in Figure 36. Notice that this represents an alternative subject linking arrangement that must be added to the collection above (Figure 25). The lexical specifications of the middle construction are as follows: the sense of the middle has a patient (it is therefore an affective dynamic event)[17], which is supplied by the referent of the subject; the referent of the middle is, exceptionally, a state predicated of the referent of the subject which takes a further state predicated of the dynamic event as its second argument (ee).

[17] Patient is a thematic role associated with a class of events. Some of these also have agents (including causative events); in this case, the patient is the ee. See 3.1.4 for further details.

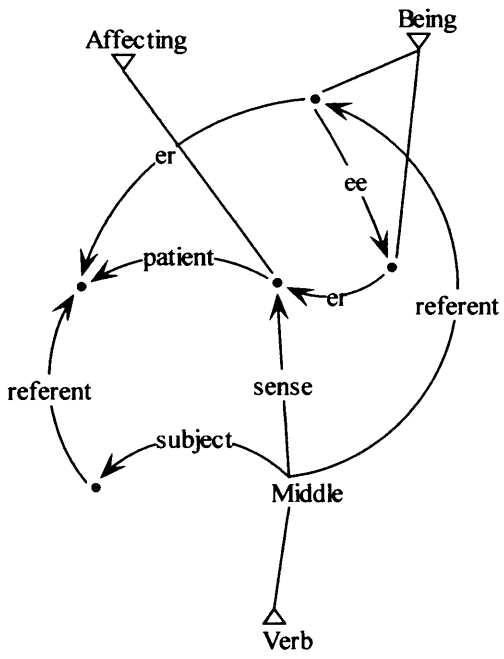


Figure 36 Middle.

Verbs in middle constructions inherit properties from their own lexical structure and from that of the construction, by multiple inheritance. Compare the case of past tense verbs, which inherit their stem and sense (and any syntactic properties) from their lexeme and properties of their referent and form from the inflectional category Past (see 1.2.2).

This double inheritance is possible in the case of middles when the lexical structure of the verb contains (as a sense of the verb) an event that can instantiate the dynamic event in the structure of the construction. This is possible when the lexical structure of the verb contains an event that elaborates the causing event in the structure of the construction and it is for this reason that middle constructions are excluded with both TOUCH and HIT: in both cases, the er of the final state is the same as the er of the event that causes it (see Figure 26, Figure 27), so that to conform to the semantics of the middle construction, these verbs would have to have both subjects and objects, which would clash with the syntax of the construction.[18] Figure 37 shows the structure of *The bread cuts easily.* The sentence refers to a state which has the ease of the

[18] Alternatively, it could be argued that the middle construction does not specify that the verb must be intransitive. In this case, middles formed with TOUCH or HIT would be indistinguishable from simple generic constructions with the same verb: *Birds hit windows with alarming frequency at this time of year.*

cutting event as its ee. The cutting event is the er of Easy (as determined by the normal lexical structure of EASILY).

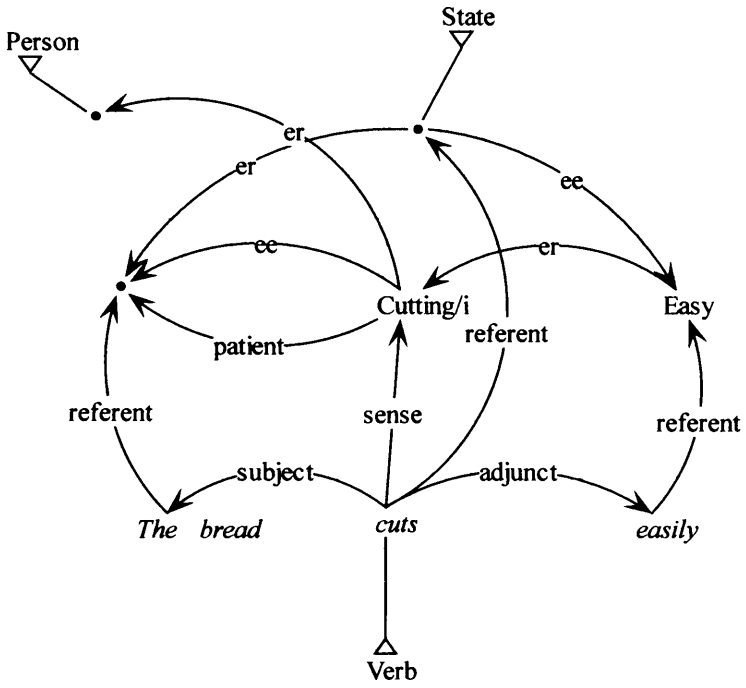


Figure 37 *The bread cuts easily.*

The construction itself specifies the kind of event that is involved, thus ruling out its appearance with verbs profiling states (for those speakers for whom this is ruled out). The use of the verb's sense (and the exceptional way of assigning a referent to utterances containing middles) account for the genericity with which the event is construed, as explained above. The presence of the modal element is not required by the syntax of the construction: a middle verb can be the dependent of the modal element (90), or its parent (91), and in certain circumstances the modal element may be absent (92). It is, however, required by the lexical semantics of the class of middle verbs: the second argument of the referent of a middle verb must be specified in the context. In the most commonly quoted examples it is a word in the sentence that supplies the relevant state, but in examples like (92) it is supplied pragmatically.

(90) Eddie's bread won't cut.

(91) Neal's bread cuts smoothly.

(92) Boy, this bread cuts!

1.3 Summary

1.3.1 The properties of WG

In this chapter I have sketched a lexical structure within the WG framework, emphasising certain properties of this structure, as listed in (93). I have also demonstrated the use of the framework in the analysis of a small set of examples. In this concluding section, I identify those parts of the analysis that particularly depend on the properties in (93), and also serve to illustrate them.

(93) a. Linguistic structure is represented in a network of conceptual categories linked by asymmetric binary relationships; both concepts and relationships are classified in an inheritance hierarchy.

b. Lexical and grammatical structures consist of generalisations over classes of concepts or relationships; the relevant properties are assigned to a single category.

c. No distinction is made between linguistic and extra-linguistic conceptual structure (knowledge of language is a proper subpart of knowledge in general).

1.3.2 Network structure

The structures of the individual lexical items (the verbs and prepositions) shown in the previous section specify the properties of all tokens of these classes. They specify form and syntactic behaviour and all relevant semantic properties, including where relevant the role played in the semantic structure by the meanings of other (syntactically related) words. In this way the lexical structure constrains the possibilities of particular combinations of words.

For example, the 'conative construction' resides in a particular use (a subcategory) of AT. This makes particular semantic demands of its parent, which must be satisfied if a successful (licit) conative construction is to be used. Compare the temporal use of AT, which makes much less specific demands of its parent (the parent must have an event as its sense: *Janet broke at 6 o'clock*, *the meeting at 4*, **the door at 2pm*). The two uses of AT have much in common, including their form and some syntactic properties, which they can inherit from a more general class.

The constructions (Transitive and Middle are given above) are lexical structures of just the same sort. They differ only in that they are more schematic: the form is unspecified and the relevant category is a class of words (of lexemes) defined by other properties, including syntactic and semantic argument-taking properties as specified by the construction itself. These properties constrain the set of possible members of the class, thereby constraining the set of words that may appear in the relevant construction.

1.3.3 The inheritance hierarchy

The inheritance hierarchy allows properties from more general categories to be inherited by their subcategories. For example, the referent of the subject in the middle construction is the er of that of the verb. This is the default linking arrangement for subjects, so that it need not be specified in the lexical representation of the middle construction. Furthermore, since the referent of the middle is a state, some force-dynamic and other semantic properties of its er (the referent of the subject) are the same as those of other ers of states (indeed of other ers generally).

It is frequently noted that the referent of the subject in a middle construction bears primary responsibility for the ease (or otherwise) of the event defined by the verb's sense. Rosta (1995) proposes a force-dynamic relationship **archagonist** to capture this semantic property. However, under the current analysis, the content of this proposed relationship derives from more general properties of states and their arguments. The state is often construed as an inherent property of the er, and part of the saliency of ers over ees (see above) is that the er carries primary responsibility for the state predicated of it. For example, if I fear spiders (or I am frightened of spiders) that is a property of mine and I bear responsibility for it; by contrast if US presidents frighten me then that is an inherent property of US presidents, and the responsibility lies with them.

1.3.4 Non-modularity

It is often claimed that the influence of lexical semantic properties on syntactic behaviour is limited to certain kinds of semantic property (see Croft 1990: 53, Jackendoff 1990, Levin and Rappaport Hovav 1992, Levin and Rappaport Hovav

1995: 9 and references there: Dowty 1991, Pinker 1989, Pustejovsky 1992, Tenny 1987, van Valin 1990). Typically, it is the **force-dynamic** properties that are held to be relevant and various **thematic** properties that are excluded from influencing syntax. The following quotation from Jackendoff illustrates the relevant view:

> "Still, it turns out that only limited aspects of conceptual structure interact with syntax. [...] For example, various syntactic processes make use of the singular/plural distinction, but none (so far as I know) ever make use of the red/orange distinction." (1990: 49)

Jackendoff's lexical conceptual structures consist (as do those of other writers) of event structure templates, representing force-dynamic and other syntactically relevant properties. The argument positions in these templates are filled by constants, which represent the other (not syntactically relevant) semantic properties. An example is given in (94), which gives a lexical structure for POCKET; this structure is different only from that for PUT by virtue of the constant, POCKET, in the final argument position.

(94) POCKET: [$_{\text{Event}}$ CAUSE([$_{\text{Thing}}$],[$_{\text{Event}}$ GO([$_{\text{Thing}}$],[$_{\text{Path}}$ TO([$_{\text{Place}}$ POCKET])])])]

The case of middles provides counterevidence to this view, since it is only by appealing to non-force-dynamic properties that the difference in (95) can be explained.

(95) a. *Bogey doesn't hit too good at this time in the morning.
b. Bogey doesn't slap too good at this time in the morning.

Hitting and Slapping (the senses of HIT and SLAP) must have the same force-dynamic properties, since one is a hyponym of the other. However, the two verbs differ as to their ability to appear in middle constructions. This difference can only be explained by appealing to highly 'encyclopedic' properties of Slapping, which license the construction in this case.

The slap in (95)b is a socially (and indeed sexually) charged form of hitting in which the slappee accepts the slap (which must land on his face) with some good grace, perhaps recognising that it was justified. Notice that (95)b does not mean that Bogey cannot be hit, rather that he cannot be relied upon to respond appropriately to a

slap of this sort. Only by the inclusion of 'extra-linguistic' information can the difference between the two examples be teased out.

2. Lexical Semantics

This thesis focuses on the lexical semantics of English words (chiefly verbs) and the compositional properties of the structures that represent word meaning. For this reason, I devote the current chapter to a discussion of some of the frameworks used in the analysis of lexical semantics and some of the issues that arise in the comparison of the frameworks.

In the first part (2.1), I introduce the motivations and common assumptions that underlie work on lexical semantics in all (or most) frameworks and show how these are represented in the WG formalism introduced above. I define semantic competence in terms of knowledge of word meaning and knowledge of the meanings of compositional structures. In the discussion of word meaning I introduce the distinction between sense and reference, I discuss some semantic relationships that hold between word meanings and I make some preliminary comments about ambiguity. In the discussion of compositional meaning I introduce the notion of compositionality, I discuss some semantic (logical) relationships among propositions (compositional structures) and I make some preliminary comments about the linking of the syntactic and semantic properties of words in compositional structures.

In the second part (2.2), I explore some of the differences between the various frameworks and some of the empirical and theoretical issues that underlie or follow from these differences. I deal with existing frameworks under the three headings **structural**, **translational** and **conceptual** approaches, comparing them with each other and with WG as outlined in the preceding chapter. Structural approaches are characterised in that they see lexical semantics as a structured semantic space where all the elements are defined by their relationships with other elements; WG lexical semantics shares this property of structural approaches. Translational approaches are characterised in that lexical semantics (indeed all meaning) is represented in an external formal system (usually a variety of predicate logic); the WG approach does not follow this assumption. Conceptual approaches are characterised in that they understand meaning in psychological (subjective) rather than logical (objective) terms - the elements of linguistic semantics are concepts in the minds of language users which are also used in more general areas of thought; the WG approach shares this view of linguistic semantics.

I go on to summarise the points of contrast and similarity between the various approaches and identify some serious theoretical issues on which there is disagreement or controversy (universality, primitives and circularity, discreteness). I consider some of the consequences of taking one or other view on these issues and some empirical means of addressing them. I finish by introducing the three areas of lexical semantic research that are explored in the following chapters: linking, aspect and ambiguity.

2.1 Common assumptions: semantic competence; lexical meaning; compositional meaning

2.1.1 Lexical and compositional meaning

The study of linguistic semantics must be seen as an attempt to define the semantic **competence** of language users. Goddard puts this study at the heart of the linguistic enterprise: "semantic competence is a crucial part of overall linguistic competence" (1998: 1), and while this is by no means uncontroversial (some researchers place semantic considerations outside the domain of linguistic investigation), it forms the basis of many research programmes.

Semantic competence can easily be defined as everything that language users need to know about the meanings of linguistic expressions, and lexical semantic competence as everything that language users need to know about the meanings of lexical items. I show below that this definition itself raises two contentious issues: just how much of what language users know about meaning is linguistically relevant, and exactly what is meant by the term **lexical item** (clearly the WG framework outlined in chapter 1 defines the term more broadly than some other frameworks, to include symbolic relationships involving classes of dependencies).

Leaving these issues aside for now, it is clear from the definition that there are two parts to semantic competence: word (lexical) meaning and compositional (structural/contextual) meaning. Different frameworks assign different degrees of emphasis to these two aspects of semantic competence, according to the kinds of structural representation they permit. However, there are assumptions that are common to (almost) all approaches, and without which semantic research cannot proceed. These are outlined here.

2.1.2 Lexical meaning: sense and reference; semantic relationships; ambiguity

An important distinction in word meanings is that between **sense** and **reference**. In the discussion of WG above I described the distinction as the difference between **lexical** and **contextual** meaning. However, it also represents a contrast between **intensional** and **extensional** meaning. Goddard (ibid: 4) quotes an example from Allan (1986), as follows. The complex expressions *the man who invented parking meters* and *the man who invented the yo-yo* share the same extension (they apparently refer to the same individual)[19], yet they are intensionally separate (they have distinct senses). Just the same argument can be found in Frege's (1923) treatment of (96), which is tautologous (to any one who knows that it is so).

(96) The morning star is the evening star.

Pronouns provide further motivation for separating sense and reference. Personal pronouns (like I and YOU) and other deictic expressions receive their meaning (referent) from the context. They can be said to have no sense (no lexical meaning). Other pronouns/words (identity of sense anaphora like ONE, DO (SO)) receive even their sense from the context. In (97) the pronoun *one* refers to a doughnut: an instance of the sense it derives from its antecedent. Note that while the sense is shared the referent is not: (97) involves two explicitly separate doughnuts.

(97) Jane had a doughnut, so I had one too.

A second feature that is common to all analyses of word meaning is the idea that there exist relationships between word meanings. The particular battery of **semantic relationships** differs according to the framework, but all frameworks recognise some logical or meaning relationships between semantic elements. Common lexical relationships are **meronomy** (part-whole relation), **hyponymy**, **synonymy** and various kinds of **antonymy**. These and other relationships play different roles in

[19] In point of fact, though both parking meters and yo-yos were marketed by a Donald F. Duncan in the US during the '20s and '30s, Mr Duncan certainly did not invent the yo-yo, which had according to some sources already been around for some thousands of years. Mr Duncan first saw the yo-yo being demonstrated at a toys and hobbies fair in Los Angeles in 1928.

different frameworks but all appear to agree that at least some of them must be included in semantic representations, either because they constitute an integral part of word meaning or because of the effect they have on the logical relationships (**entailment**, **contradiction** etc) holding between complex expressions (which are discussed in the following section).

I showed above that WG recognises a number of different semantic relationships, which include part (meronym) and isa (hyponym)[20]. It is not likely that WG lexical structures will make use of a single relationship of antonymy, because of the lack of any single property that obviously connects the various different kinds of oppositeness (antonymy is generally categorised into complementarity, gradable (or true) antonymy and converseness).

Not all of these relationships are of the same kind: meronymy and the others are purely semantic relationships, whereas synonymy and its converse **homonymy/ polysemy** (like some kinds of antonymy) involve sense relationships, relationships between semantic and syntactic elements. Because these kinds of relationship both involve unusual linking patterns, they are obviously of great significance in the treatment of the relationship between syntactic and semantic structures. Homonymy and polysemy particularly have been studied in depth by many researchers in lexical semantics, often under the broader heading of ambiguity, which subsumes both homonymy and polysemy as well as structural ambiguities.

Ambiguity is dealt with at length in chapter 5. For now I note two generally accepted properties of ambiguity: first that it can be classified, and second that it is closely interrelated with context. Lexically ambiguous words may be disambiguated by their contexts, or the context may coerce ambiguous words into particular interpretations, even to the extent where they license interpretations that are not lexically associated with the word, as in (98), where the noun MOLE, which usually refers to a countable object is interpreted as referring to a mass, this interpretation being forced by the absence of an article.

(98) In Mali they eat marinated mole.

[20] Of course, isa is not an exclusively semantic relationship since it holds between concepts of all kinds.

The simplest classification of ambiguity is a division into homonymy, or chance ambiguity, where the two meanings are not related, and polysemy, or motivated ambiguity, where some semantic relationship holds between the two meanings. This simple classification is often extended into a 3 or more point scale (see for example Croft 1998a), with some writers noting the difficulty of classifying some cases on such a scale, as well as of distinguishing ambiguity from vagueness. Some of these scales are inspected below (5.1.2), where I also develop a classification of ambiguity (or non-monotonic linking) on two dimensions: according to whether the ambiguity is motivated or unmotivated, and according to where in the linguistic structure the ambiguity lies.

2.1.3 Compositional meaning: logical relationships; compositionality; linking

Just as most frameworks recognise some semantic/logical relationships obtaining between the meanings of lexical items, so they also accept that any account of semantic competence must be able to describe the semantic/logical relationships obtaining between the meanings of complex expressions. For example, one proposition may **entail** another (99)/(100), or **contradict** another (99)/(101), or the two may be **synonymous** (99)/(102).

(99) Sam is Liz's son.
(100) Sam is Liz's child.
(101) Sam is Liz's daughter.
(102) Sam is Liz's male child.

As I show below, the various semantic frameworks differ as to which of these two kinds of logical relationship (lexical or propositional) is assigned priority. Under the analyses making use of meaning postulates, the meanings of lexical items ('son', 'daughter', 'child', 'male', etc) are defined in terms of the logical relationships between expressions containing them (eg (99)-(102)). In structural analyses, by contrast, the meanings of lexical items are defined by the logical relationships that hold between them ('son' is a hyponym of 'child' and an antonym of 'daughter', and so on) and it is

these lexical relationships that determine the logical relationships between complex propositions like (99)-(102).

Despite this difference in priority, both kinds of approach recognise that both kinds of relationship must be represented in the analytical framework. Furthermore, both kinds of approach recognise a direct correspondence between the two kinds of relationship. The meaning of a complex expression is directly determined by (and/or directly determines) the meanings of the individual elements within it.[21]

Thus any account of (conceptual) semantics must be able to analyse complex structures in terms of the individual meaning elements that make them up. Furthermore, any account of linguistic semantics must be able to describe the way in which words and their meanings combine in sentences. Linguistic semantic structures are said to exhibit **compositionality**, in that the meaning of a complex structure is a function of the meanings of its parts. This idea can be traced back at least as far as Frege (1923), and informs the work of a variety of researchers in lexical semantics. For example, Montague (1974) assumes a homomorphism between syntax and semantics: the rules of semantic composition directly reflect the rules of syntactic composition so the meaning of a syntactically complex expression is a direct function of the meanings of its (syntactic) parts.

Many frameworks recognise that this principle has an important consequence for syntactic, as well as semantic, analysis. Since the meanings of linguistic elements determine the structures of complex expressions, they can also act as constraints on the combinatorial (syntactic) properties of the elements themselves. This possibility is represented in the Projection Principle and θ-criterion of GB (Chomsky 1981: 36, 38), as the Bijection Principle in Lexical Functional Grammar (Bresnan 1982) and in the predicate argument structure of Rappaport and Levin (1988) among others. Correspondence between syntactic and semantic relationships is mediated in WG by the syntax-semantics principle as described above (1.2.3.2).

Considerations of parsimony have led many writers to propose that lexical semantic structure may be wholly responsible for **linking**: if syntactic composition can

[21] This is generally taken as the definition of the boundary between semantics and pragmatics: whatever properties of meaning follow compositionally from the parts of the utterance are semantic. Not all frameworks place this boundary in the same place.

be controlled by lexical semantic structures, then an adequate semantic specification for all lexical items may obviate the need for syntactic valency or rules of syntactic composition. For example, as noted above (1.1.2), the basis for Levin's research programme is that verb behaviour can be used "to probe for linguistically relevant pertinent aspects of verb meaning" (1993: 1), and that these linguistically relevant aspects of verb meaning constrain the kinds of construction in which a verb may appear.

This presupposes an account of the regular relationships between syntactic and (conceptual) semantic structures. Once furnished, an account of this kind can work in one (or both) of two directions: by describing the projection of semantic onto syntactic structure, a linking theory allows the prediction of syntactic behaviour from conceptual properties, and the explanation of the semantic selection of arguments; by describing the projection of syntactic structure into semantic structure, it allows the observable syntactic relationships between words to be used to determine their compositional meaning (see my comments in 1.1.2).

Many theories of linguistic semantics develop such an account and though the theories differ as to whether the focus is on the projection of semantic onto syntactic properties or vice versa, the accounts have much in common. Most accounts see linking as a relationship between two sets of structures, syntactic and semantic, both defined by function/argument relationships, the major differences involving how the functions are represented, and how the mapping between the two structures is achieved. It should be noted, however, that in some frameworks, such as Cognitive Grammar (CG), linking regularities are not required in the grammar: in CG, the rules of linguistic structure refer only to semantic functions, so these need not be linked to syntactic structures (indeed there are no syntactic structures or categories for them to be linked to) (see Langacker 1987).

Approaches to linking can be divided into two categories: those based on **semantic classes** and those based on **thematic roles**. In the former, the senses of words are classified, according to semantic features including aspectual or force-dynamic properties, into predicate and argument types, which determine the linking properties of the words; in the latter, the senses of words support argument positions which are linked to syntactic role types according to the thematic roles they carry.

I have already stated in the introduction that this thesis concerns itself with the question of how much syntactic compositionality can be determined by lexical semantic structure. Since these structures must exist in order to allow language users to grasp the meanings of words, it seems like a good idea to get them to do as much syntactic work as possible. These questions are explored more fully in 3.1.

2.2 Approaches to lexical semantics: structural, translational and conceptual approaches; WG; issues

2.2.1 Structural, translational and conceptual approaches

There is a wide variety of approaches to lexical and linguistic semantics, some of which are explored in this section. I identify three main trends in the representation and analysis of meaning: **structural**, **translational** and **conceptual** approaches. I consider each of these in turn, describing and exemplifying the salient features of each approach and outlining their consequences for the treatment of compositional meaning and argument linking. While the three headings serve as a helpful framework for the discussion of the alternative approaches, they are not to be taken as mutually exclusive. In fact, there is as usual considerable overlap, many writers combining features of more than one of the headings. Furthermore, there are in some cases important differences between the frameworks dealt with under each heading. Some of these differences are explored here.

2.2.1.1 Structural approaches

Structuralism is one of the earliest approaches to word meaning. Geeraerts (1994) traces it back to Weisgerber (1927) and Trier (1931). At its strongest, the structuralist approach assumes that word meanings exist in an exhaustively structured semantic space, where all the elements are defined solely by their relationships with other elements. The relevant semantic relationships include those identified in 2.1.2 above. So, for example, 'man' and 'woman' are defined as hyponyms of 'human' and antonyms of each other, distinguished by their sex. Similarly, 'boy' and 'girl' are distinguished from each other by their sex and from 'man' and 'woman' by their age, or maturity. In this way, the conceptual category 'human' is exhaustively divided into four sub-categories which together define a semantic field. This semantic field is defined by

further oppositions in a larger field (say 'mammal'). Between them, the semantic fields exclusively and exhaustively define semantic space.

A number of objections to this kind of approach have been raised by various writers. Not least of these is the difficulty of assigning individuals conclusively to one or other class (is a 16 year old male who works for a living and supports a wife and child a man or a boy?). Another objection concerns the treatment of other words like for example PRESIDENT, whose meaning certainly belongs in the 'human' field, but is defined by neither age nor gender. Further, though the category 'human' can be divided into men, women, boys and girls by simple binary features (+/-(fe)male, +/-adult), the larger category 'mammal' is not so simple. To define the class of humans in terms of binary oppositions with other mammals, it is necessary to classify them as -cat, -rodent, -horse, -marsupial, etc. Later I argue that the first of these objections actually identifies a strength of feature-based analysis, in that the same uncertainties apply to many related concepts (see 2.2.1.2); the second and third objections do represent problems with feature-based structural accounts of lexical semantics.

Whatever the status of these objections, there exist many highly convincing accounts of linguistic semantics that can be called structural in that they define meaning in terms of the relationships that hold among semantic elements. Cruse (1986) develops a complex system of relationships between lexical semantic elements, in which compositional meaning is mediated by (minimal) semantic constituents which consist of pairings of syntactic forms and semantic principles to yield a complex sentence with a global (complex) meaning (ibid: 24).

An alternative approach to lexical semantic representation that conforms to the structuralist trend is that of **componential analysis**. In componential analyses, word meanings are defined by semantic features, in much the same way as phonological features can be used to define the phonemes of a language. Componential analyses do not suffer from the problems outlined above, since these derive from the contrastive nature of the structural definitions: in relational structural analyses a concept is defined in terms of what it is not; in componential analysis, concepts can be defined in terms of what they are (their components or properties) and so it is not necessary to exhaustively define the entire semantic field. Many writers have applied this technique to the meanings of verbs.

One property of this kind of approach which I discuss below (3.2.3, chapter 5) is that the meanings of words (particularly verbs) are often formed out of two parts: on the one hand a predicate argument structure giving the class of the word's meaning and other properties that determine its combinatorial behaviour, all of which may be shared with other meanings, and on the other a constant identifying its idiosyncratic properties. For example the meanings of the verbs BREAK and DIE might be decomposed as in (103) and (104), where they share the same predicate which accounts for the common aspectual and other combinatorial properties, but differ as to the constant that represents the result in each case. I argue below that this only partly satisfies the demands made on lexical semantics identified above, since it stops short of describing what it is that language users know about the particular meanings of words.

(103) BREAK: become (x, BROKEN)
(104) DIE: become (x, DEAD)

Jackendoff's conceptual structure (1983, 1990) provides a good example of the decomposition of the meanings of verbal predicates into more basic predicates. For Jackendoff, Putting is defined in terms of Causing and Going, and Going can be further defined in terms of Becoming and Being (or Being-located). This allows a classification of events into event-types, represented by the basic predicates. In Jackendoff's framework, lexical items are specified as to their form (spelling/pronunciation), (syntactic) word class and lexical conceptual structure (LCS). The LCS determines both the compositional properties of the lexical item (by the unification of suitable elements with the arguments of complex predicates) and the linking to syntactic structure (by a general linking principle that makes use of a thematic and syntactic role hierarchy). Jackendoff's framework is discussed at greater length below (in 3.1.2 and in chapter 5), but I present a brief analysis here, adapted from Jackendoff (1990).

(105) a. put
V

[Event CAUSE([Thing A],[Event GO([Thing A],[Path TO([Place A])])])]

b. Jimi

N

[Thing JIMI]

c. guitar

N

[Thing GUITAR]

d. on

P

[Place ON([Thing A])]

e. shelf

N

[Thing SHELF]

(105) gives the lexical entries for PUT, JIMI, GUITAR, ON and SHELF. The three parts of each entry correspond to the form, the syntactic word class and the lexical conceptual structure (LCS) respectively. The LCSs of these lexical items can be combined to make the complex conceptual structure in (106).

(106) [Event CAUSE([Thing JIMI A],[Event GO([Thing GUITAR A],[Path TO([Place ON([Thing SHELF])])])])]

This structure contains three arguments to be linked to syntactic roles (marked with subscript A). The linking principle links these to subject, object and prepositional complement roles respectively, yielding the syntactic structure in (107) (I do not analyse the internal structure of *the shelf* nor that of *the guitar*).

(107) [Jimi [put [the guitar] [on [the shelf]]]]

Levin's (1993) approach to word meaning is similarly decompositional. She identifies 49 major classes of verbs in English, distinguished on the basis of particular semantic features such as causation, contact and motion and further divided according

to their argument-taking properties. While Levin does not deal with the compositional properties of semantic representations, it is clear that this proceeds in much the same way as in Jackendoff's analysis, yielding a complex argument structure. Projection onto syntactic structure is also, as in Jackendoff's analysis, the product of a derivational process. Rappaport and Levin (1988) argue for a level of predicate-argument structure (**PAS**), derived by correspondence rules from the semantic structure, which in turn defines (deep) syntactic structure by means of further correspondence rules.

Other decompositional approaches handle the projection of semantic onto syntactic structure by means of transformations. In Generative Semantics, for example (see Katz 1972, Katz and Postal 1964, Lakoff 1969, McCawley 1976), the complex semantic structure of a causative verb like KILL, shown in (108), is transformed by semantic rules into the simple predicate structure shown in (109), which in turn supports the syntactic structure of sentences like (110).

(108) x cause (y die)
(109) x kill y
(110) Biddy killed the chicken.

Some of the frameworks I discuss below (2.2.1.3) under the heading of conceptual approaches make use of similar predicate argument structures which provide a schema defining the relationships between the words in a sentence. Furthermore some of the approaches dealt with in this section could be considered conceptual, since they make the claim of psychological reality (for example, Jackendoff's (1990) syntax of thought representations and Wierzbicka's (1996) Universal Semantic Metalanguage are both claimed to be innate properties of human cognition).

2.2.1.2 Translational approaches

In addition to the objections identified above, which can perhaps be addressed by refining our class of semantic relationships, the structuralist approach to word meaning

has been subjected to a more serious charge on theoretical grounds: that it necessarily leads either to circularity or to infinite regress.

This line of argument is followed by Wierzbicka (1996) and Goddard (1998: 49-50), among others, who reason as follows. If 'mother' and 'father' (for example) are to be defined in terms of 'parent' (and the feature 'sex'), then 'parent' itself ought to be more perspicuous than either 'mother' or 'father', or at least it must itself have a definition. Leaving aside the question of whether 'parent' really is more basic than either 'father' or 'mother', this raises the question of how 'parent' is to be defined. Either it must be defined in terms of further, putatively more basic, concepts or it must be defined as the disjunction of 'mother' and 'father'.

The first of these alternatives is claimed to lead to infinite regress: what are the primitive terms of the system which need no definition? The second alternative is circular: we cannot claim to have defined two concepts if we have done nothing more than to have described the way they relate to each other. Remember that in WG, this circularity of lexical semantic definition is considered a strength, rather than a weakness; see 2.2.2.

This argument, that the definitions of semantic concepts cannot be given in terms of other semantic concepts, leads to the conclusion that they must be given instead in terms of some external system or reality. Goddard argues for such a semantic metalanguage:

> "For all intents and purposes, it is impossible to analyse or describe meanings except in terms of some other language" (1998: 11).

The tools of symbolic or formal logic have been adopted with some enthusiasm in the expression of linguistic meaning. Formal logic provides for the unambiguous expression of propositions, which in turn allows a clear understanding of inferential relationships between them. This facility apparently makes formal logic a good candidate for a semantic metalanguage and much work has been done in Formal Semantics translating natural language expressions into logical formulae (see for example Montague 1974, Heim and Kratzer 1998).

A number of features of predicate logic have proved particularly helpful in constructing these translations: predicate argument structure closely models the relationships between verbs (and other relational lexemes) and nouns (at least in

languages like English); the use of variables in argument structure is useful in the treatment of relative pronouns and other natural language terms that have context-dependent meaning; a sophisticated quantifier system permits the investigation of indeterminacies of scope and other features of expressions involving quantification.

Formal Semantics has two goals: to explain the concept of meaning and through that explanation to explain the role of language in information processing (both individual deductive reasoning and collective communication) (v.Eijck 1994: 1276). Both of these goals can be met by the properties of symbolic logic.

In this approach, meaning is equated with truth: to know the meaning of an expression is to know the conditions under which it is true (which in turn determine its logical relations with other expressions). For example, the expression *Snow is white* is true if and only if snow **is** white. The difficulty with this conception of meaning is that propositions like these seem vacuous: the truth conditions of an expression amount to a simple restating of it. If the truth conditions are to have any useful meaning, they must be stated objectively in a distinct formalism. This is the role of symbolic logic in the explanation of linguistic meaning. The statement of truth conditions can then be expressed, less trivially, as in (111).

(111) *Snow is white* is true iff $\forall x$ (snow(x) $\rightarrow$ white(x)).

The second goal of Formal Semantics (to explain the role of language in information processing) is achieved using the deductive mechanisms of logic. Formal logic defines the kinds of valid inferences that can be made between propositions, accounting for the way in which language users process the information content of utterances and for the logical/semantic relationships between propositions identified above (2.1.3).

In 2.1.3 I also introduced Frege's principle of compositionality. This is relevant to Formal Semantics in different ways for different researchers. In Montague's (1974) treatment of natural language expressions, linguistic constituents are combined according to syntactic principles (Categorial Grammar), which determine how their meanings are combined into expressions of truth conditions like (111). However, Heim

and Kratzer argue (1998) that Frege views compositionality as an integration of semantic (=logical) structures:

> "it is a natural conjecture that logical combination of parts into a whole is always a matter of saturating something unsaturated" (Frege 1923: 51).

That is to say that semantic composition consists of the unification of semantic elements with the unfilled argument positions of predicates, which can proceed independently of syntactic composition. It follows from this that there is no need for interpretation rules linking specific syntactic constructions to specific semantic structures:

> "It should be sufficient to specify the denotations [=senses] of the lexical items, and the rest should follow automatically" (ibid: 43).

Despite its proficiency in describing compositional meaning, it is less clear how Formal Semantics accounts for word meaning:

> "Formal Semantics has little or nothing to say about the interpretation of semantic atoms" (v. Eijck 1994: 1276).

One approach to word meaning within a logical translational model is that of meaning postulates. A meaning postulate is a logical formula, one that constitutes an analytic statement. That is to say, it is an expression in the semantic metalanguage about the meaning of a linguistic expression that is true in all world contexts. While a meaning postulate (as a redundancy rule) expresses a necessary truth, it does not express a logical truth (a tautology), since it relates natural language terms to terms of the formal metalanguage.

For example, instead of being decomposed into the complex structure 'cause to become not alive' as in some decompositional approaches, the predicate 'kill' can be defined by meaning postulates as in (112).

(112) a. If (kill (x,y)) then (die (y))

b. If (die (x) then ¬(alive (x))

In this formulation, the bracketed parts represent the natural language elements that are being defined, the rest of the formula being expressed in the formal metalanguage. The

functions 'kill', 'die' and 'alive' are unanalysed atoms of linguistic semantics and the meaning postulates in (112) describe the logical relationships among them.

In this way, the meaning postulates approach has something in common with relational approaches to structural semantics like those discussed above: both permit the analysis of semantic structure as a relational network with unanalysed lexical concepts as nodes. The only difference is that, under the meaning postulates approach, the relationships that define the network are logical statements like those in (112).

This logic is, for Fodor (1975, 1994), to be seen as a **language of thought**, which embodies intensional mental states. It is by hypothesis both universal and primitive. All mental (or higher cognitive) processes are held to be (embodied in) computational operations over language of thought representations. This leads to a further similarity with one of the structural approaches discussed above. Jackendoff's conceptual (semantic) structures are expressions of what he calls a **syntax of thought** (1990: 10). However, there is an important difference between these two notions. For Jackendoff, the syntax of thought is a set of principles for combining semantic elements (atoms) into complex structures. These structures are the semantic representations of natural language expressions. For Fodor, however, the semantic representations of natural language expressions are simply atoms, which stand in particular (lexical) relationships with representations in the language of thought.

Wierzbicka (1972, 1996) also makes use of a metalanguage to give definitions of semantic atoms. Unlike Fodor's metalanguage, however, Wierzbicka's consists of a (by hypothesis universal) set of around 60 primitive elements (see (113), from Wierzbicka 1998: 114-115), which combine into expressions in much the same way as the elements of natural language (English). These expressions are used in **reductive paraphrase analyses** (RPAs), which are decompositional accounts of the semantic/logical entailments of natural language predicates. (114) gives an example of an RPA for *mother*.

(113) Proposed universal semantic primes.

Substantives: I, YOU, SOMEONE(PERSON), SOMETHING(THING), PEOPLE, BODY.

Determiners: THIS, THE SAME, OTHER.

Quantifiers: ONE, TWO, SOME, MANY/MUCH, ALL.

Attributes: GOOD, BAD, BIG, SMALL.

Mental predicates: THINK, KNOW, WANT, FEEL, SEE, HEAR.

Speech: SAY, WORD, TRUE.

Actions, events and movement: DO, HAPPEN, MOVE.

Existence and possession: THERE IS, HAVE.

Life and death: LIVE, DIE.

Logical concepts: NOT, MAYBE, CAN, BECAUSE, IF.

Time: WHEN(TIME), NOW, BEFORE, AFTER, A LONG TIME, A SHORT TIME, FOR SOME TIME.

Space: WHERE(PLACE), HERE, ABOVE, BELOW, FAR, NEAR, SIDE, INSIDE.

Intensifier, augmentor: VERY, MORE.

Taxonomy, partonomy: KIND OF, PART OF.

Similarity: LIKE.

(114) *X is Y's mother=*

at some time before now, Y was very small

at this time, Y was inside X's body, Y was like a part of X

because of this, people can say something like this:

X wants to do good things for Y

X doesn't want bad things to happen to Y

Wierzbicka presents RPAs for lexical items like *mother* (114), or *bicycle* (1985: 104-123), relational terms (including the meanings of verbs) being handled by variables as in (114). However, the universal semantic metalanguage (USM) can also be used to assign meanings to constructions, as in (115) (Wierzbicka 1998: 125), the RPA for examples like those in (116).

(115) *Person X 'Verbed' person Y into doing Z=*

a. X wanted Y to do Z

b. Y didn't want to do Z

c. X didn't say to Y: "I want you to do Z"

d. X thought that if X said this Y wouldn't do Z

e. because of this X did something else

f. because of this after this Y did Z

g. Y didn't do it because Y wanted to do it

h. Y did it because X wanted Y to do it

i. Y wouldn't have done it if X had not done this

(116) a. She talked him into going by car.

b. She tricked him into going by car.

c. She manoeuvred him into going by car.

d. She pushed him into going by car.

USM approaches to linguistic semantics have been attacked for a number of reasons. Specifically, Hudson and Holmes argue that definitions cannot be given in terms of primitives alone (2000: 4-6). Wierzbicka's definition of *bicycle* refers at several points to the pedals. However, since PEDAL is not part of the USM, it cannot be used as a term in the definition and the pedals are referred to variously as "the parts that stick out at the side", "the parts for the feet" etc. Hudson and Holmes argue that, given that these parts are the same in each case (they are represented by the same concept), this must be recognised in the analysis by using the same term each time. Of course, Wierzbicka can define PEDAL separately and use it in the relevant places, or otherwise coindex the terms referring to the pedals. However, whatever the means of coindexing, this still admits non-primitive terms into the analysis, which Wierzbicka rules out on principle.

A further objection to USM accounts, which treat senses as atoms, concerns the pairs 'child' and 'adult', 'boy' and 'man' and 'girl' and 'woman' which I have already discussed. In 2.2.1.1, I noted that these concepts are often used in arguments against a feature-based analysis of lexical semantics. These arguments turn on the difficulty in assigning particular instances (particular people) clearly to one of the categories. However, one characteristic of these concepts that supports the idea of semantic features is that the same uncertainties apply to all three pairs: just the same uncertainty as to the boundary between 'child' and 'adult' applies between 'boy' and 'man' and between 'girl' and 'woman', affected by just the same considerations. Under a feature-

based approach, the uncertainty can be explained as deriving from the difficulty of assigning the feature [adult]. Under the USM approach, where there are no features, the fact that the uncertainty applies to more than one pair can only be seen as a coincidence, which is a serious shortcoming in the explanatory power of such approaches, especially since patterns of this kind are very common in many areas of the lexicon.

2.2.1.3 Conceptual approaches

The third trend in lexical semantics to be presented is the conceptual approach. The essential difference between conceptual and translational approaches is that, in the former, meaning is understood in psychological (subjective) rather than logical (objective) terms. That is to say that linguistic structures are understood in terms of their cognitive function: reference. There is no semantic metalanguage, since meaning is embodied in the cognitive (semantic) structures associated with words. Under this analysis there is no question of translational equivalence, such as links *kill* with *cause to die* in other analyses: while *Mark killed a mouse* may be objectively (intensionally) equivalent to *Mark caused a mouse to die*, the two differ in subjective interpretation and so must have different conceptual representations. Similarly, the expressions *half full* and *half empty* offer different construals of the same objective situation.

The case of verbs like LOAD is highly relevant to the question of construal: *load the cart with beer* and *load the beer onto the cart* differ subjectively according to whether the vehicle or the load is perceived as affected. As is well known, this difference in construal affects the acceptability of the two expressions in different objective situations (their truth conditions): the second expression is incompatible with a situation where some but not all of the beer is loaded onto the cart. Furthermore, as I show below, a convincing case can be made that the difference in the construals of the two constructions also affects the abilities of particular verbs to appear in each construction. FILL, for example, necessarily profiles a process affecting the container, and while it can appear in constructions similar to the first pattern above, it cannot appear in constructions similar to the second (117). POUR, which profiles a means of affecting the contents (it selects physical properties of the contents), shows the opposite pattern (118).

(117) a. Phyllis filled the fridge with fish.

b. *Phyllis filled the fish into the fridge.

(118) a. *Paulene poured the pond with the paw paws.

b. Paulene poured the paw paws into the pond.

It is not the case, however, that the contrast between the logical and psychological views of meaning corresponds to that between axiomatic (translational) and conceptual approaches. For example, Wierzbicka's axiomatic analysis is essentially conceptual, in that the USM is held to be psychologically real: it is the (innate) "irreducible core of all languages, reflecting the irreducible core of human thought" (1998: 113). Jackendoff's componential analysis is also (as I note above) based on a psychological view of meaning. His mental representations consist of conceptual structures in a universal syntax of thought and his view is that natural language semantics "must be concerned with how language users are constructed to understand and schematize the world" (1991: 9).

By far the strongest tradition in the conceptual approach is represented, however, by Cognitive Linguistics (see for example Croft 1991b, Fillmore 1982, Lakoff 1987, Lakoff and Johnson 1980, Langacker 1987). These approaches are characterised by a number of features. First, as I have already said, Cognitive Linguistics sees meaning and other aspects of linguistic structure as psychological phenomena. The representations applied are representations of cognitive structure and not logical (mathematical) formulae.

Second, writers in Cognitive Linguistics do not subscribe to the autonomy of syntax thesis. Tomasello (1998: ix-x) argues that this thesis is a corollary of the mathematical formalism of Generative Grammar, which requires that syntactic structures be analysed in an objective logical framework. This entails that those aspects of linguistic structure that are not susceptible to objective analysis (including subjective aspects of meaning such as those sketched above) must be excluded from the domain of syntax.

Further, a number of other distinctions that are commonly made by researchers in other traditions are not recognised in Cognitive Linguistics. For example, the

distinction between semantics and pragmatics, that between lexical and compositional structures and that between lexical and encylopedic knowledge each are denied by at least some cognitive linguists. In a framework where the meaning of an expression is understood in terms of its subjective construal by language users, it is not possible to exclude in principle anything of what language users know from linguistic structure. Under this analysis, linguistic structure consists of a network of interconnected **schemas** or cognitive models which represent what language users know. As I show below, these models have an internal structure of their own.

One consequence of the non-modular position for lexical semantics is that word meanings, like other linguistic categories, must be of the same type as other conceptual categories. A great deal of work has been carried out in many disciplines that shows that conceptual categories must have internal structure. Wittgenstein (1953) famously argued for a structured representation of the concept 'game', consisting of a number of related sub-concepts. Austin (1961) also explored this idea, applying it explicitly to the meanings of words. Rosch (1978), working in cognitive psychology, devised a number of experiments to show that the categories that language users employ exhibit both centrality and membership gradience. Taylor (1995) develops a sophisticated model of prototype structures for linguistic categories of all sorts, including word meanings and other, more fundamental, categories like noun and verb, subject and object. Taylor's categories consist of structured networks of elements connected by semantic relationships such as metaphor, metonymy, and shared semantic features (family resemblance).

Lakoff (1987) develops a structured conceptual representation for the meaning of OVER, based on Brugman's earlier (1981) work on the preposition. In this analysis, the meaning of OVER is represented by six interrelated schemas. The schemas themselves form family resemblance categories (of the kind introduced by Wittgenstein), with up to nine sub-senses, defined by a number of semantic features shared by some, but not necessarily all, sub-senses.

The notion of schemas is an important one in Cognitive Linguistics, and one that gives rise to a certain amount of confusion. This confusion comes about through the use of the same word to apply to two (apparently) different phenomena and through the use of different words by different writers to refer to the same

phenomenon. Lakoff uses the term **schema** for the general cognitive structure against which the meaning of a word is understood. Langacker, however, explicitly uses the term only to refer to a generalisation over the various meanings of a word and uses **domain** for the former sense. Domain, in this sense, overlaps considerably with what other writers have called **frames** (Fillmore 1985), **scripts** (Rosch 1978), **scenes**, and **idealized cognitive models** (Lakoff 1987).

The essential idea is that the meaning of a word is understood against a specific conceptual background. For example, 'Monday' is understood against the background of the domain of the days of the week, 'lid' against the background of the domain of containers, and so on. There is a sense in which these two notions (generalisations over linguistic models and the conceptual background against which they are understood) are simply different aspects of the same phenomenon: if 'lid' is to be defined in general terms as a device permitting closure of a container, the generalised (schematic) conceptual structure representing that meaning must involve a schema for containers. In a sense, a schema (under Langacker's use) is a domain viewed from without and a domain is a schema viewed from within.

Langacker (1987, 1998) develops a complex conceptual analysis of linguistic structure including linguistic semantics: Cognitive Grammar (CG). In CG, words and other linguistic structures are signs: pairings of formal (=phonetic) and conceptual (=semantic) representations. These structures combine with each other according to general principles which refer to their internal structure. The conceptual structures are defined by their content (schema/domain), profile (sense) and construal (focal prominence). For example, as Figure 38 (from Langacker 1998: 10) shows, *advise*, *advisor* and *advisee* have the same conceptual content, but differ as to their profile.

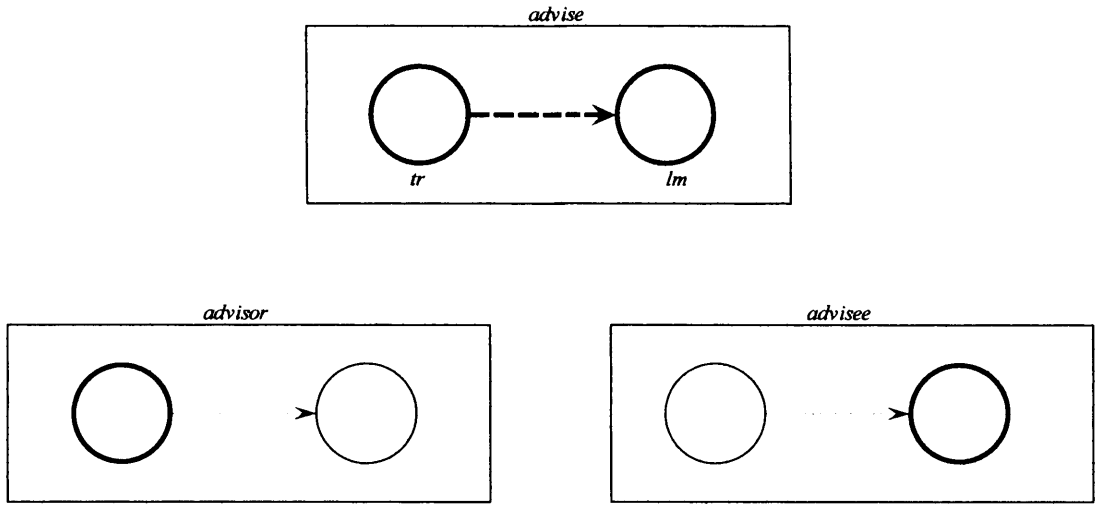


Figure 38 *advise*, *advisor*, *advisee*.

The content in each case is a complex relationship between two individuals that is understood against a background of verbal and social interaction, summarised in the diagrams by the arrow connecting the two participants. In the case of the verb, this whole relationship is profiled, as well as the two participants (labelled **tr** and **lm**, for trajector and landmark, to distinguish their roles). However, in the cases of the two nouns, only one participant is profiled. Figure 39 (ibid: 11) shows the conceptual structures of *above* and *below*, which have the same content and profile but differ as to their construal. In the case of *above*, the position of the higher participant is understood with reference to that of the lower; in the case of *below*, the reverse is true. This difference is represented in the different assignment of the trajector and landmark relationships.

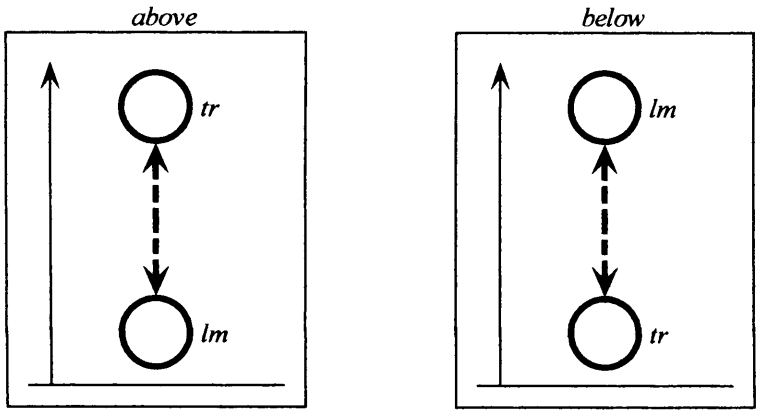


Figure 39 *above*, *below*.

In order to illustrate how CG deals with complex expressions and compositionality, I briefly present an analysis of the phrase *the cup on the table* adapted from van Hoek (1995: 317-320). A number of features will be made clear, including just what is meant by **content**, **profile** and **construal**, the differences between head-modifier and head-complement relationships and the nature of the structures representing grammatical rules.

Van Hoek's account begins with the analysis of the prepositional phrase *on the table*, which is represented in Figure 40.

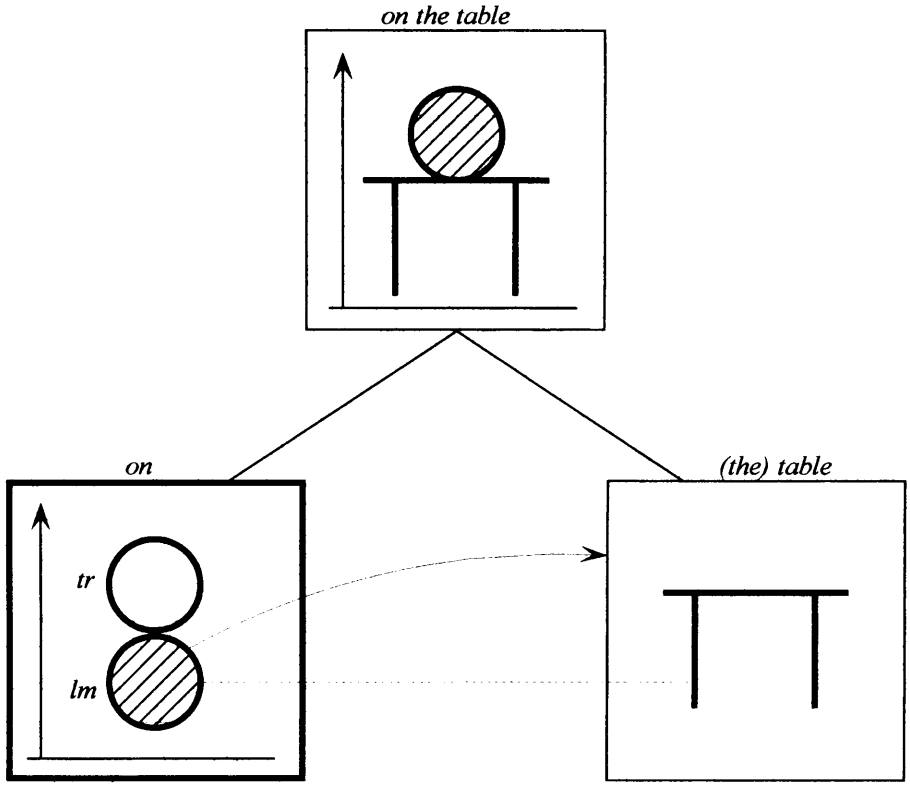


Figure 40 *on the table.*

This figure gives a schematic representation of the semantic pole of the phrase. At the lower level, there are two semantic structures, *on* and (*the*) *table* (throughout this analysis, the contributions of the articles are ignored), which combine to yield the structure for the phrase at the higher level. This combination is controlled by the model for *on*. *on* profiles a relationship between two objects such that one (the trajector) is higher than the other (the landmark) and also in contact with it. This is shown iconically by the two circles. The landmark is connected to the model of *table* by an arrow which stands for the elaboration relationship: the schematic landmark in *on* is

elaborated (made more specific) by the model of *table*. The landmark is shaded (as part of the lexical specification of the preposition) to indicate that it requires elaboration. The broken line connecting the landmark with the profile of *table* shows the correspondence between them: they are to be taken as different conceptualisations of the same entity. The box surrounding the model of the preposition is marked in bold lines, to indicate that it is the profile determinant of the construction (the combined structure at the higher level profiles a relationship, not a thing).

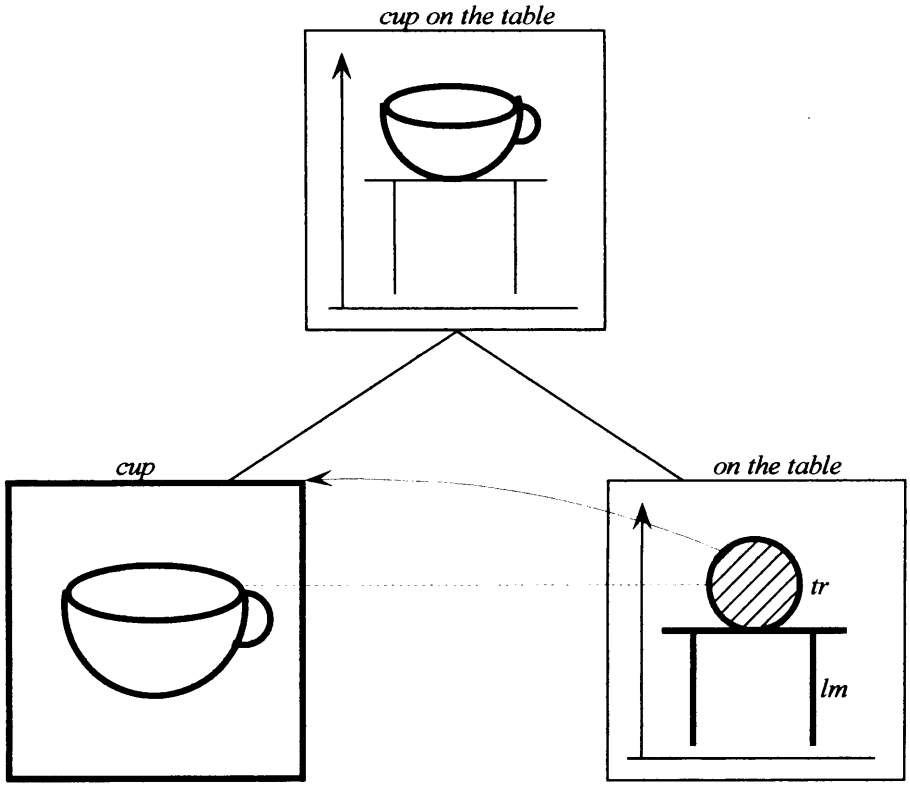
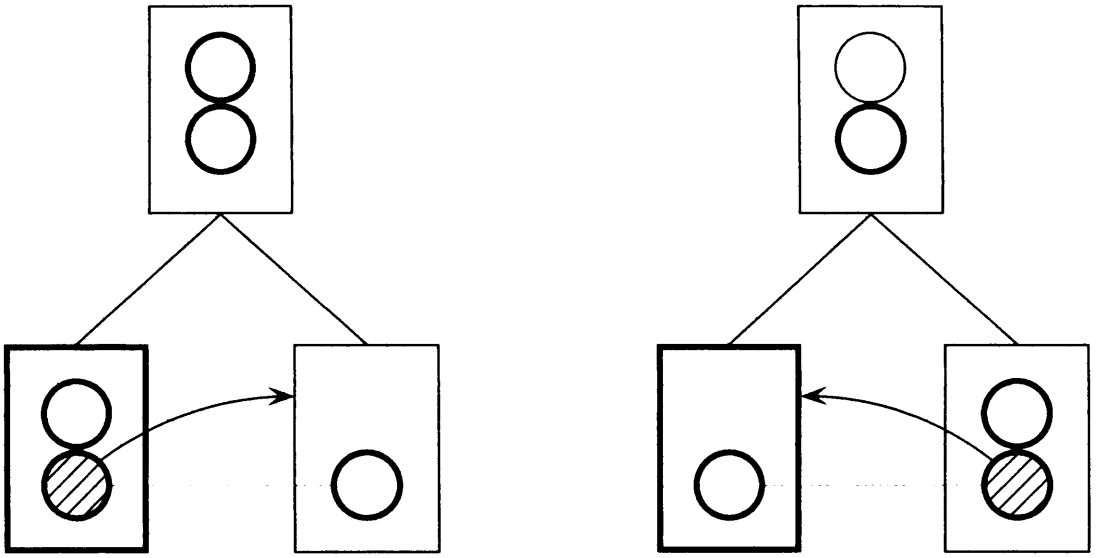


Figure 41 *cup on the table.*

Figure 41 shows the semantic structure of the phrase *cup on the table*. Here the profile determiner *cup* elaborates the trajector of the prepositional phrase. In the composite structure the *on* relationship appears as the schema but the profile is only the trajector in this relationship (the cup).

These two diagrams show an important asymmetry between head-complement and head-modifier relationships, which has already been discussed above (1.2.3.2, 1.2.4, 1.2.5). In Figure 40, the complement elaborates a salient part of the schema of its head (the profile determinant); in Figure 41, by contrast, the head elaborates a salient

part of the schema of its modifier. This contrast is represented schematically in Figure 42.



Head-complement structure

Head-modifier structure

Figure 42 Head-complement and head-modifier relationships.

The contrast between complements and modifiers represented in Figure 42 has two parts. First, complements differ from modifiers in that the former fill argument positions in the schemas of their heads, while the latter provide schemas whose argument positions are filled by the profile of the head. Second, head-complement and head-modifier constructions have a common property: that in both cases the profile of the composite structure is determined by the head. This pattern is common to many frameworks. For example, Cruse (1986: 103-105) shows that while modifiers are always optional (119), complements are always either obligatory or, if optional, then present latently when omitted (ie semantically obligatory) (120).

(119) a. We drank (red) wine.

b. Arthur slept (soundly).

c. She is (very) tall.

(120) a. Arthur stroked *(the cat).

b. John is watching. ['John is watching something'].

He also shows that the semantic properties of complements are selected by the parent (121), whereas adjuncts select the semantic properties of their parents (122).

(121) a. Arthur drinks beer/*cheese.

b. Arthur drank what she made him [→ She made him a drink]

(122) a. Her pregnant sister/*brother came round.

b. Her pregnant cousin came round. [→ A female cousin came round]

These contrasts can be explained by appealing to Figure 42, where the complement takes a role determined by the parent and the modifier determines the role to be played by the parent. Cruse also shows that head-complement and head-modifier constructions have a common property: that the meaning of the head can encapsulate that of the complement or modifier. (123) and (124) are pleonastic, according to Cruse, because the dependent adds nothing to the composite meaning. This can also be explained by appealing to Figure 42, where it is always the head that determines the profile of the composite structure. In WG, this surfaces in the principle of semantic phrasing: the referent of the composite structure is a specialisation of the sense of its head.

(123) ?Arthur drank liquid.

(124) ?My male uncle came round.

The schematic representation in Figure 42 amounts to a generalisation across linguistic structures. In this way, grammatical rules can be represented using the same formalism as that for individual lexical items. So Langacker's framework recognises complex categories as lexical items. In fact, he explicitly denies a clear distinction between lexical and non-lexical structures:

> "A lexical item is 'fixed' in the sense of being both learned by individual speakers and conventional within a certain speech community. Because both are a matter of degree, there is no strict boundary between lexical items and 'novel' elements." (1997: 12).

Goldberg (1995, 1998, 2002) also recognises complex constructions as lexical items. In the Construction Grammar framework (for references see 1.2.1), the grammar consists of a **constructicon** (Jurafsky 1992) which includes lexical entries for specific words and for more schematic constructions. A construction is defined as "a form-function pair such that some aspect of the form or some aspect of the function is not strictly predictable from [its] component parts" (Goldberg 1998: 205). See Verschueren (1981) for a similar idea. For Goldberg, as for Verschueren, this notion helps preserve strict compositionality in the grammar: the schematic relationships encoded by constructions function as the component parts in larger structures that otherwise would not be compositional.

For Goldberg, as for Langacker, linguistic structures are form-function pairs that link more or less schematic semantic models with more or less schematic syntactic/phonological patterns. She proposes constructions for such general syntactic patterns as double objects (125), caused motion (126), resultatives (127), intransitive motion (128) and transitives (129) (1998: 206).

(125) Pat faxed Bill the contract.
(126) Pat sneezed the foam off the cappuccino.
(127) She kissed him unconscious.
(128) The fly buzzed into the room.
(129) Pat cubed the meat.

Significantly, Goldberg argues against positing a new verb sense for every syntactic frame a given verb participates in. The possibility of occurring in a given construction can be predicted from the properties of the construction and the lexical properties of the verb. Considering examples like (126), she argues that it would be "implausible and ad hoc" (ibid: 205) to assign a caused motion sense to the verb. This argument is obviously consonant with my own claims in the previous chapter and it is an idea to which I return in the following chapter.

2.2.2 Word Grammar lexical semantics in context

I have discussed the (lexical) semantic structures of WG in the previous chapter. I return to them here so that they can be compared with the various frameworks discussed in the preceding sections. WG is like the conceptual frameworks in that meaning is understood psychologically: the relational network defines all of cognitive structure and the meanings of words are fully integrated with it.

However, WG differs from most frameworks in cognitive linguistics in that its semantic structure does not make use of frames, consisting instead of a classified associative network (see Hudson and Holmes 2000 for a detailed discussion of this issue). As described above, a word's lexical meaning is represented by its sense, which is defined by the semantic relationships that it supports. So, for example, the relationship between ADVISE, ADVISOR and ADVISEE is as shown in Figure 43 (those who, like me, feel uncomfortable with the implication that ADVISEE is a word of English could try thinking of it as the result of a productive lexical (morphological) rule of the sort discussed above (1.2.3.1), and below (chapter 5)).

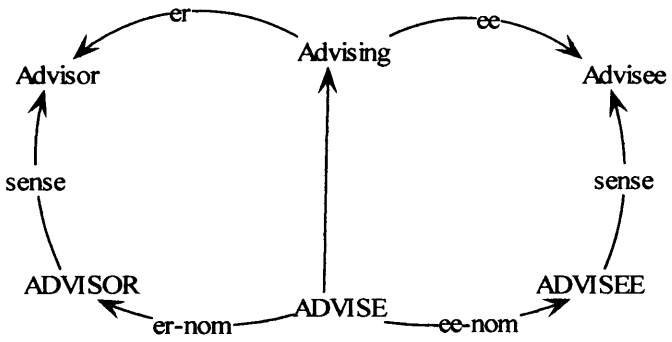


Figure 43 ADVISOR, ADVISE, ADVISEE.

As in CG (see Figure 38), the WG structure for the verb provides (some of) the framework on which the composite structure is to be arranged. The difference is that, since WG does not make use of frames, the meanings of the dependents correspond not to parts of the meaning of the head but to associated concepts. The significance of this difference will become clear in the data chapters, where I give examples of dependents whose lexical semantic structures radically restructure the semantic network surrounding the sense of the parent (for example, non-selected resultative expressions (chapter 4)). This is made possible in the WG framework by the fact that this semantic

network consists of independent concepts and associations, and is not a subpart of the structure of the parent word.

A further consequence is that, as I showed in 1.2.3 above, since the lexical structures of words are not self-contained schemas, but rather simply subparts of the wider conceptual network, the meanings of the three lexical items in Figure 43 effectively contain each other: the background against which they are understood is the same.

This difference aside, the correspondences between WG and CG semantic structures are close. The head-complement relationship shown in Figure 42 corresponds to the (revised) syntax-semantics principle introduced above (1.2.3), and repeated here.

(130) **Revised syntax-semantics principle** (RSSP): a word's valent refers to a dependent of its sense.

As I noted above, the relationship between words and their adjuncts (= modifiers) in WG is more complex than that shown in Figure 42. The limiting case for adjuncts is as shown in that diagram. For example, in the case of a bare relative (eg *the book I bought*) the sense of the noun depends on the referent of the verb that depends on it (the sense of the noun is the buy-ee). In the case of a spatial preposition, however, the referent of the preposition and the sense of its parent are mutually dependent. As I show in Figure 44, the preposition defines the place of the sense of the noun, while the noun provides the er of the referent of the preposition (it is the thing located). Other relational terms that appear as adjuncts also follow this pattern. Finally, in the case of a temporal adverbial like *one day*, the adjunct refers to the time of the sense of its parent, so this case conforms to the same pattern as applies to valents. As also noted above, there is in fact a further possibility, that a word and its dependent are coreferential. This possibility is found with both valents (*this book*) and adjuncts (*boy who*).

WG (as described above), like CG, recognises constructions as lexical items. The RSSP is an example of a generalisation over linguistic structures, as are the various linking regularities proposed above (the subject, object and indirect object linking rules in 1.2.4.3, 1.2.4.2 and 1.2.3.3 respectively), and fleshed out in chapter 3.

WG semantic analysis is structural, in that semantic elements are defined solely in terms of the relationships they support. It is not componential, in the sense used for Jackendoff's approach among others, since the concepts in a network structure are atoms: they can have no internal structure. However, it does incorporate some of the insights of predicate argument structure. The 'arguments' of a relational predicate are represented by its dependents. This provides WG with a more sophisticated battery of semantic relationships than the traditional structural accounts. Finally, WG semantic structures also make use of meaning postulates in a certain sense.[22] For example, the semantics I assign to ON in Figure 44 shows that the ee of On is the er of a supporting relationship whose ee is the er of On. This is tantamount to a meaning postulate to the effect that 'if on(x, y) then support(y, x)'.

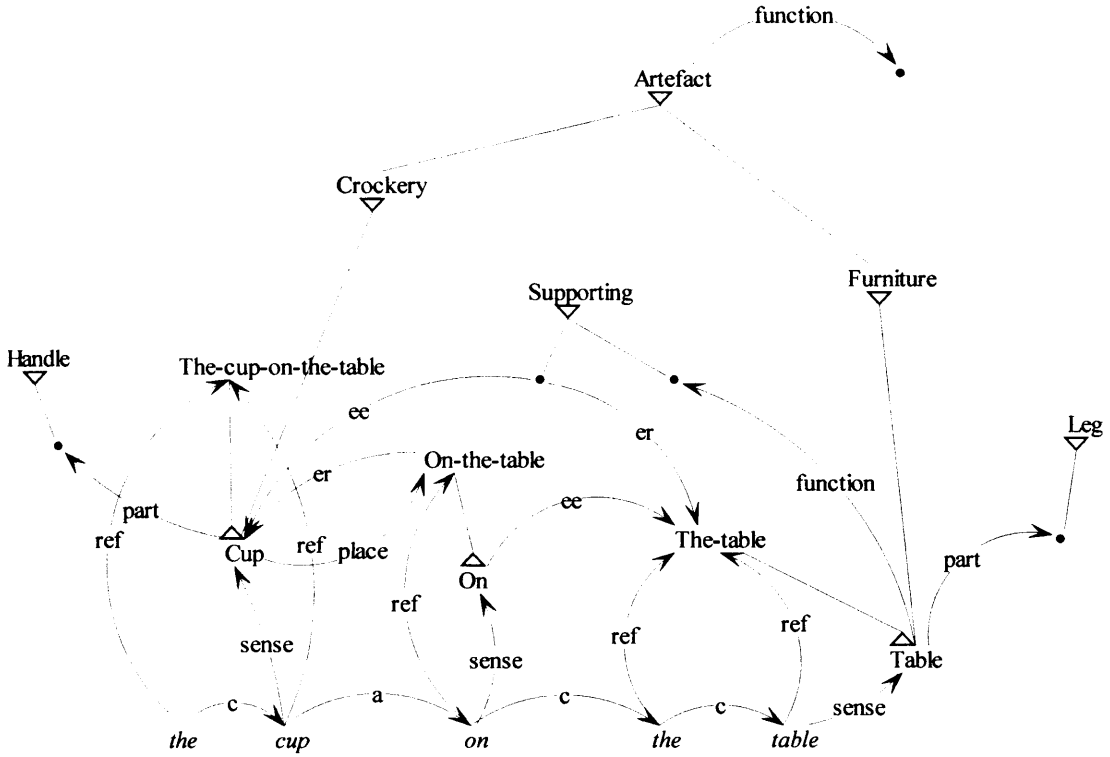


Figure 44 *the cup on the table.*

Figure 44 shows the composite structure of *the cup on the table*. The referent of *on* isa Location, so its two arguments are a trajector (er) and a landmark (ee) (see above (1.2.4.2, 1.2.4.3), below (chapter 3). The landmark is the referent of the complement (this is part of the lexical structure of ON, or of prepositions in general)

[22] I owe this insight to Richard Horsey (pc).

and the trajector is the sense of *cup*, its parent. On (the sense of ON) is also lexically associated with an example of Supporting connecting its er and ee (this is part of the meaning of ON). The (lexical) semantic structures for Table and Cup (which are intended to be suggestive rather than exhaustive) show that they have parts (Legs, Handles etc), that they are examples of Artefacts (by way of Furniture and Crockery respectively), from which they inherit the function relationship. Conveniently, the function of Table isa Supporting.

In this part I have looked back at the properties of WG semantic analysis showing how it shares some of the properties and mechanisms of other frameworks. In the following part I summarise some of the (more or less controversial) theoretical issues and assumptions in lexical semantics and consider the WG position with respect to each of them.

2.2.3 Issues in lexical semantics: universality; primitives and circularity; discreteness

In the preceding sections I have identified some existing approaches to lexical semantics. In this part I identify some of the contentious issues raised in the analysis of semantics (and other aspects of linguistic structure). I also note the position with respect to these parameters of each of the frameworks discussed, particularly that of the WG framework that I use in the following analyses.

For the most part, structural theories of meaning explicitly or implicitly assume the **universality** of semantic categories, though Generative Semantics does not. Jackendoff makes an explicit claim of universality, as do Wierzbicka and the researchers working in translational frameworks. In Cognitive Linguistics and in WG, no explicit claims of universality are made. On the contrary, the only elements of linguistic structure that are universal are the general organisational principles. In Cognitive Linguistics these include schemas and instantiation, profiling, construal etc. In WG they are the isa and dependency relationships.

Universality is, or would appear to be, a necessary property of a framework that makes use of primitives (these primitives must be external to the language system and thus either unlearnt or learnable from other evidence than the language to which one is exposed). In WG, where linguistic structure and meaning are construed subjectively

and where the rules even of syntax are integrated in the general conceptual network, language learning proceeds according to the same mechanisms as more general learning and so there need be no universal properties inherent in language per se.

Conversely, it is only in an analysis that lays claim to universality that it makes sense to ask what are the **primitives** of semantic structure. The structural theories of linguistic semantics that have universal categories also have primitives, as do the translational approaches. For this reason also, primitives are not used in WG semantics. However there is another, more principled reason for excluding primitives. Recall that Wierzbicka argues for the use of primitives in semantic analysis by saying that without them the definitions of word meanings suffer from circularity or lead to infinite regress.

This argument is frequently taken for granted in works on semantics. Saeed, for example sees circularity as one of the three chief challenges in semantic analysis. He poses the question:

> "can we ever step outside language in order to describe it, or are we forever involved in circular definitions?" (1997: 6)

and later:

> "These three issues: circularity; the question of whether linguistic knowledge is different from general knowledge; and the problem of the contribution of context to meaning, show that our definitions theory is too simple to do the job we want." (ibid: 7).

In a network structure like that of WG, however, circularity is seen as an analytical strength and not a weakness. In a relational network all the elements are defined in terms of their relationships with other elements. In this way, the definition of Supporting (for example) supports that of Table, and vice versa. It is part of the definition of Table that its function (or one of its functions) isa Supporting and also part of the definition of Supporting that the function of Table is one example of it. This is the principle of recycling and it is described in detail in Hudson and Holmes (2000).

The analytical strength of this interdependence is that it permits the semantic structures to be used in explaining the ability of words to co-occur. For example, the close relationship between Table and Supporting can be used in explaining why TABLE appears more naturally with ON than with IN: *the cup on/*in the table*. Under an analysis where the meanings of words are defined in terms of language external

concepts, this sort of interdependence between words can only be described by duplicating all semantic concepts and the relationships between them internally to the linguistic system either in a system of 'linguistic semantic' properties or in semantic features attached to syntactic expressions. Both alternatives rather beg the question.

Many frameworks of linguistic analysis recognise the **discreteness** of particular levels of analysis. Relevant boundaries include those between: syntax and semantics, various levels of syntactic analysis, lexical and encyclopedic knowledge and lexical and grammatical knowledge.

All theories recognise the syntax/semantics distinction to some extent (except for CG, where there are no rules that refer to syntactic categories), if only in as much as there are specifically syntactic and specifically semantic categories and relationships and rules that operate over them. In WG the lexeme is the locus of syntactic information and its sense the locus of semantic information. While there are regularities that involve both syntactic and semantic categories, there are also those that involve only syntactic or only semantic categories. This form of weak modularity was discussed above (1.2.2).

One important difference must be recognised between the weak modularity of WG and the approaches of other frameworks (like Levin's approach or that of Formal Semantics). As I noted above (1.2.2), the fact that WG linguistic information is represented in a network of dependency relationships means that the different levels of analysis cannot be formally different: syntactic and semantic structures are represented in the same kinds of structure. By contrast, in Levin's approach, for example, semantic and syntactic information is represented in two formally distinct codes, with different properties. This means that there are differences in the kinds of structure and relationships that can hold between them at the different levels of representation. It also leads to the introduction of intermediate levels that translate relationships of one kind into relationships of another, as I show in the following section.

Many of the approaches discussed above have little or nothing to say about syntactic analysis. Rappaport and Levin (1988) make this assumption explicitly. They also argue for a further level of structure, **predicate argument structure** (PAS) that mediates between semantic and syntactic representations. Both Cognitive Linguistics and WG explicitly deny the presence of any formally distinct intermediate levels of

representation, either between syntax and semantics (in WG this interface is mediated by the sense and referent relationships) or internal to syntax:

> "WG is **mono-stratalist** because it generates only one syntactic structure per reading." (Hudson 1990: 10, emphasis in original).

WG (like the conceptual approaches) explicitly denies the distinction between lexical and encyclopedic knowledge about semantic categories. Because linguistic information is represented in a network structure, different kinds of knowledge about the same concept can be simply represented in different kinds of relationship supported by it (see Hudson and Holmes 2000). Furthermore, as argued above, the psychological view of meaning makes it impossible to exclude, in principle, any information from having an effect on linguistic structure. Most other writers make this distinction explicitly, or else assume it implicitly. It has been taken for granted in so much work on linguistic semantics that it is almost impossible to question it in most frameworks (see again Saeed 1997: 6-7)). I argue throughout this thesis that the proper characterisation of many linguistic phenomena requires the analyst to rethink this assumption.

The distinction between lexicon and grammar is made explicit in Levin's work:

> "a verb's behaviour arises from the interaction of its meaning and general principles of grammar." (1993: 11).

This work follows from the suggestion of Bloomfield (1933) that the lexicon is the repository of idiosyncratic information about words and their behaviour, grammatical generalities being stated in some other formal system. This view derives partly from the use of logical languages in linguistic analysis: a logic consists of a vocabulary of terms (variables and relationships) and a formal syntax that controls their combination. However, the view is challenged by many of the writers discussed above. As noted, constructions appear as lexical items in the frameworks of Jackendoff, Wierzbicka and the Cognitive Linguists, as well as in WG. Hudson makes this quite clear:

> "WG is **holist** because no distinction is recognised between the grammar 'proper' and the lexicon. The grammar includes facts at all levels of generality, all of which are handled in the same way." (1990: 10, emphasis in original).

The consequences of this holism for the syntax/semantics distinction have already been discussed.

2.3 Linking, aspect and ambiguity

In this chapter I have introduced some of the basic principles of research in lexical semantics. I have also looked at some approaches to this research, and compared them with the WG framework. In the following chapters I look more closely at three areas of lexical semantic research: linking, aspect and ambiguity.

Theories of lexical semantics must be concerned with the mechanisms involved in linking, since these mediate the process whereby semantic arguments are projected onto syntactic structure (or syntactic structures are interpreted in semantics). This is important in the determination of the semantic structures of individual words (what must they be like given that they project onto syntax in the way that they do? why do some words behave in apparently contradictory ways?), and in the understanding of compositionality (how do the lexical structures of words combine in sentences?). In the chapter on linking (chapter 3) I examine some existing approaches to linking, and present a WG account. In the discussion I focus on the way in which event structure, as represented in chiefly verbal semantics, corresponds with syntactic structure and the way in which the wide range of semantic roles corresponds with the relatively narrow range of syntactic dependencies.

Aspect is a (semantic) property of sentences, a compositional property determined by specific properties of the elements of the sentence. Lexical semantics must be able to explain how the meanings of words (and constructions) combine to give specific interpretations. It is also well known that some words or constructions are diagnostic of aspectual properties, in that they may only be used in expressions of one or other aspectual class, and that in certain cases, these diagnostic words can themselves constrain the aspectual interpretations of sentences. Lexical semantics must be able to explain how this coercion works. In the chapter on aspect (chapter 4) I consider the range of aspectual classes identified by Vendler (1967) and extended by Croft (1998b) and give them WG semantic structures; I also show how these semantic structures are linked to syntactic structures in a way that explains the various diagnostics used by Vendler and Croft.

Ambiguity presents an obvious challenge to theories of lexical semantics. The phenomenon I investigate in chapter 5 includes cases where particular lexical items are

used with (apparently) varying interpretations and aspectual and linking properties. Lexical semantics must be able to account for these cases, and also for the way in which those lexical items can be disambiguated by other elements in the sentence, in a process of coercion like that that applies in the aspectual examples. In chapter 5 I consider some ways of classifying and identifying ambiguity and present WG analyses for some kinds of ambiguity.

In the chapter on linking I also introduce some data about verbs of motion, and show how the WG linking structures introduced in the first part of the chapter can be used to describe and explain the behaviour of the various verbs of motion. In the following chapter I introduce some data about resultative expressions, and use them to probe the notion of telicity introduced in the first part of that chapter. I also provide WG analyses for three classes of resultative expression. In the chapter on ambiguity, I also introduce some data involving verbs with both causative (*I broke the window*) and unaccusative (*The window broke*) uses. I show how the WG treatment of ambiguity is applied in these cases, and compare it with some alternative approaches.

3. Linking and Verbs of Motion

3.1 Linking

3.1.1 Linking and compositionality: argument structure; semantic selection; role- and class-based approaches

I state above (2.1.3, 2.3) that any description of linguistic semantics must be able to account for the way in which words and their meanings combine in sentences. Clearly (except in CG) this presupposes an account of the regular relationships between syntactic and semantic structures: a description of the mechanisms involved in **linking**.

The search for an adequate account of linking has two further motivations: it makes it possible to explain the syntactic argument-taking properties of words (and therefore obviates the need for valency lists or other stipulative representations of subcategorisation facts); and it provides a framework for dealing with words whose argument-taking properties vary regularly with the word's meaning (many such cases are treated below and in the work of other writers in the field of lexical semantics including Copestake and Briscoe 1996, Croft 1990, Goldberg 1995, Lemmens 1998, Levin 1993, Levin and Rappaport Hovav 1995, Pustejovsky 1995 and Pustejovsky and Boguraev 1996a).

Levin and Rappaport Hovav provide yet another reason to seek an account of argument linking: that it is an intrinsic part of the structure of language. In their introduction, they make the following claim:

> "To the extent that the semantic role of an argument is determined by the meaning of the verb selecting it, the existence of linking regularities supports the idea that verb meaning is a factor in determining the syntactic structure of sentences. **The striking similarities in the linking regularities across languages suggest that they are part of the architecture of language.**" (1995: 1, my emphasis)

As I make plain shortly, it is not the meanings of verbs alone that are relevant in determining semantic structure. It should also be clear that I do not share Levin and Rappaport Hovav's conviction of the similarities across languages in the **details** of argument linking. However, I accept readily that the **fact** of argument linking, and the mechanism that controls it, must be shared across languages.

The linking regularities that we seek are generalisations over correspondences between syntactic and semantic relationships. In the WG framework described in the previous chapter, they take the form of specialisations or refinements of the Revised

Syntax Semantics Principle (RSSP) (1.2.3.2). In the previous chapter, I provided linking rules for the syntactic relationships subject, object and indirect object (1.2.4.3, 1.2.4.2, 1.2.3.3 respectively), albeit somewhat schematically in the case of the former two. In the course of the present section, I address the outstanding issues, providing more detailed linking rules for subjects and objects, and for the parents and complements of prepositions.

The data to be considered is of two kinds: the successful linking rules will explain how specific syntactic relationships are interpreted in semantic structure (giving an account of **compositionality**) and also explain how specific semantic relationships are projected into syntactic structure (giving an account of the **semantic selection** of dependents). Much work has been done in the field of lexical semantics (see for example the list of names above), much of it focussed on the argument-taking properties of verbs. However, if the account is to provide a full explanation of grammatical structure we must also consider the properties of other argument-taking words, including prepositions and nouns with relational semantics, and, given the different behaviour of valents and adjuncts discussed in 1.2.3.2 above, also those of words that function as adjuncts.

The sentences in (131)-(136) exemplify some of the relevant data:

(131) a. The gazelle choked to death.

b. The hyena choked the gazelle to death.

(132) a. The hyena laughed.

b. *The gazelle laughed the hyena.

(133) a. The great white hunter drove on the river bed.

b. The great white hunter drove onto the river bed.

(134) a. The great white hunter went on the river bed.

b. The great white hunter went onto the river bed.

(135) a. The medicine man gave the hunter a charm.

b. The medicine man made the hunter a charm.

(136) a. The medicine man made the hunter (into) a god.

b. The medicine man made the lion's claw *(into) a charm.

A properly developed theory of linking will explain, among other things, how the referents of the dependents of the verbs in (131)a and b are assigned their semantic roles, including how both refer to the death of a gazelle; it will also explain the difference between the roles of the referents of the subjects in (131) and (132)a, and explain the unacceptability of (132)b; it will explain why the two sentences in (133) receive different interpretations, and why those in (134) do not; it will explain the similarities and differences between the sentences in (135); and it will explain why the preposition is obligatory in (136)b, but not in (136)a.

All these questions are addressed in this and the following chapters, except the last. The two sentences in (136) appear to involve different meanings of the verb. The first case has a performative flavour: the hunter becomes a god in the medicine man's act of making; other verbs with similar meanings are CROWN (*The archbishop crowned him king*) and ELECT (*They elected her president*); this construction is discussed in Verspoor (1997). The second case has a slightly different interpretation: the medicine man performed some (unspecified) act which caused the transformation of the claw into a charm (the two events are separate). I return to these examples at the end of this part of the chapter (3.1.5).

In the remainder of this section I discuss some approaches to linking in the lexical semantic literature and go on to compare these to the WG approach detailed in chapter 1. In the last part of the section I also elaborate on the subject and object linking rules given in the previous chapter.

I divide the approaches to linking into **role-based** and **class-based** approaches. In the former, linking regularities are stated in terms of the roles played by the arguments, generally consisting of regularities linking semantic (thematic) roles (such as agent, causer, theme and patient) to syntactic arguments (subject, object, oblique, etc) or argument positions (external, internal, etc); some of these approaches are discussed in the following section (3.1.2). In the latter, linking regularities are properties of classes of predicates, which define the number and type of arguments and determine the interpretation of the composite structure; some of these approaches are discussed in 3.1.3. The difference is, in some cases, more one of emphasis than of substance, particularly since it is often the case in both kinds of approach that predicates are classified according to the kinds of role that they support.

Nevertheless, the classification is a helpful one in as much as there are identifiable properties that distinguish the two classes, as will become clear. For example, in a role-based account linking regularities are necessarily represented in categories of a different kind from the lexical entries for particular words, but in a class-based account it is possible (though not obligatory) to treat linking regularities as simply more general cases of these individual lexical structures. Furthermore, since in many role-based approaches assignment of role is fully deterministic (like arguments always being assigned to like roles), the linking regularities themselves must be made flexible in these approaches; in class-based approaches the flexibility can be introduced at the level of role assignment.

3.1.2 Role-based approaches to linking: thematic roles; proto-roles; projection rules

Role- or relation-based approaches to argument linking can be found in Case Grammar (Fillmore 1966, 1968), in GB (Chomsky 1981), and in the work of Gruber (1965) and Jackendoff (1983, 1987, 1990) among others.

In a role-based approach, the lexical semantic structure of a word that selects syntactic complements consists of a predicate with a number of arguments. These arguments represent thematic roles or role types (**theta-roles**) and their number and nature is determined by the predicate. These roles are projected onto syntactic argument positions in a regular (though not necessarily monotonic) way.

Commonly, the thematic roles associated with a predicate are simply listed in its lexical specification. However, in some approaches, they are derived from specific properties of the word's meaning. For example, Jackendoff (1987, 1990), as detailed in chapter 2, proposes a **syntax of thought** into which the meanings of words can be decomposed. Lexical conceptual structures (LCSs) written in this syntax of thought consist of predicate argument structures. These structures, which represent the semantics of the word, have indices to show which structural positions are to be linked to syntactic arguments and the relevant thematic roles are determined by the structural position of each indexed argument.

The LCS is formed from a set of primitive categories which classify all conceptual entities. Jackendoff does not supply a definitive list, but the salient

categories include Thing, Event, Action, State, Place and Path. Thematic roles are assigned by sub-classes of these basic conceptual categories. For example, the Agent role is defined as the first argument of the Event category CAUSE; Theme is defined, among other things, as the first argument of the Event categories GO and STAY and of the State categories BE, ORIENT and EXT (=Extending). Source and Goal roles are defined by the Path categories FROM and TO respectively, and so on (Jackendoff 1990: 249).

(137) and (138) show LCSs for EAT and ENTER ((137) is taken from Jackendoff (ibid: 253)). (137) has two indexed arguments, marked by subscript A. The first of these is an Agent, the second a Theme (the angled brackets around the subscript in this case indicate its optionality). These two arguments are linked to the subject and object respectively. (138) demonstrates a problem with this approach in that it has a single argument (a Theme), which must, unlike the Theme in (137), be linked to the subject.

(137) *EAT*: [CAUSE ([$_{\text{Thing}}$]$^{\alpha}_{A}$, [GO([$_{\text{Thing}}$]$_{<A>}$, [TO[IN[MOUTH-OF[α]]]])])]

(138) *ENTER*: [GO([$_{\text{Thing}}$]$_{A}$, [TO[IN[$_{\text{Thing}}$]$_{<A>}$]])]

The non-monotonicity exemplified in (137) and (138) has long been recognised in theories of linking. A common solution to this problem in role-based approaches involves the ranking of thematic roles in a hierarchy. Jackendoff's approach exemplifies this. Thematic and syntactic roles (though they are not primitive) are chosen from a finite and ordered list. Again there is no definitive list, or definitive ordering, but both can in principle be determined empirically. The linking principle is as appears in (139) (ibid: 249).

(139) Hierarchical Argument Linking:

> Following the thematic hierarchy, order the dominant theta roles in the LCS of a verb V from 1st to nth. To derive the syntactic argument structure of V, map this ordering of theta roles onto the 1st through nth roles in the syntactic hierarchy.

Since Agent precedes Theme in the theta role hierarchy and subject precedes object in the syntactic role hierarchy, the Agent is linked to subject and the Theme to object in (137), whereas in (138), where there is no Agent, the Theme is linked to subject.

Notice that this principle refers to the "dominant theta roles". This is important since Jackendoff, unlike other writers (for example, this is ruled out by the projection principle and theta criterion of GB: Chomsky 1981: 36, 38), allows a given element to be assigned more than one thematic role (for example the Agent of *LIKE* is also its Experiencer). The dominant theta role of a given element is the earliest in the hierarchy.

An alternative approach to non-monotonic linking is proposed in Dowty (1991), who rejects the notion of thematic role hierarchies. Among the problems associated with this idea that Dowty identifies are the fact that no definitive list of thematic roles has been provided, with new roles being proposed all the time, and the frequency of disagreements about the specifics of list ordering. Dowty's solution is to recognise just two roles, the "cluster-concepts" PROTO-AGENT and PROTO-PATIENT. These roles collect together the various semantic properties of agents and patients, and assignment to each role is on a case-by-case basis, and by best fit, so that a semantic argument with the same conceptual properties may be assigned to a different proto-role according to the other properties of the predicate.

Dowty's protoroles consist of "A SET OF ENTAILMENTS OF A GROUP OF PREDICATES WITH RESPECT TO ONE OF THE ARGUMENTS OF EACH" (ibid: 552, caps in original). The relevant entailments identified in the paper are given in (140) and (141) (ibid: 572), though Dowty allows for the possibility that these lists are open to improvement on the basis of empirical considerations.

(140) Contributing properties for the Agent Proto-role:

a. volitional involvement in the event or state

b. sentience (and/or perception)

c. causing an event or change of state in another participant

d. movement (relative to the position of another participant)

(e. exists independently of the event named by the verb)

(141) Contributing properties for the Patient Proto-role:

a. undergoes change of state

b. incremental theme

c. causally affected by another participant

d. stationary relative to movement of another participant

(e. does not exist independently, or not at all)

These proto-roles are referred to in the argument selection principle given in (142) along with its two corollaries (ibid: 576). Notice that the argument selection principle applies only to predicates with two or more arguments. In the case of a predicate with only one argument, that argument for Dowty automatically links to the subject relationship (ibid: 605ff). The corollaries provide for marginal cases, those which tolerate variation in their linking arrangements, and for ditransitives and other three-argument predicates (some of which, like SPRAY and LOAD, are also marginal).

(142) ARGUMENT SELECTION PRINCIPLE: In predicates with grammatical subject and object, the argument for which the predicate entails the greatest number of Proto-Agent properties will be lexicalised as the subject of the predicate; the argument having the greatest number of Proto-Patient entailments will be lexicalised as the object.

(143) COROLLARY 1: If two arguments of a relation have (approximately) equal numbers of entailed Proto-Agent and Proto-Patient properties, then either or both may be lexicalised as the subject (and similarly for objects).

(144) COROLLARY 2: With a three-place predicate, the nonsubject argument having the greater number of entailed Proto-Patient properties will be lexicalised as the direct object and the nonsubject argument having fewer entailed Proto-Patient properties will be lexicalised as an oblique or prepositional object (and if two nonsubject arguments have approximately equal numbers of entailed Proto-Patient properties, either or both may be lexicalised as direct object).

A third approach to non-monotonicity is provided by Rappaport and Levin (1988) and elaborated in Levin and Rappaport Hovav (1995). Under this approach, the relationship between general conceptual properties and syntactic roles, as defined by

structural position, is monotonic, but transformations can intervene between deep and surface syntactic representations, so that, for example, structural objects appear as surface subjects. Levin and Rappaport Hovav introduce syntactic data to support their claim that unergative structures like (145) and unaccusative structures like (146) differ structurally (ie in deep syntax). This data is considered in this and the following chapters.

(145) The lady coughed.
(146) The lady vanished.

Linking, in Levin and Rappaport Hovav's approach, is mediated by linking rules that refer to conceptual/thematic roles and project them onto structural argument positions. The three structural argument positions external argument, (direct) internal argument and indirect internal argument correspond to the (deep) syntactic roles subject, object and indirect object respectively. The four linking rules used in Levin and Rappaport Hovav (1995) are given here:

(147) *Immediate Cause Linking Rule*

The argument of a verb that denotes the immediate cause of the eventuality described by that verb is its external argument. (ibid: 135)

(148) *Directed Change Linking Rule*

The argument of a verb that corresponds to the entity undergoing the directed change described by that verb is its direct internal argument. (ibid: 146)

(149) *Existence Linking Rule* (revised)

The argument of a verb whose existence is asserted or denied is its direct internal argument. (ibid: 153)

(150) *Default Linking Rule*

An argument of a verb that does not fall under the scope of any of the other linking rules is its direct internal argument. (ibid: 154)

Under Levin and Rappaport Hovav's analysis, verbs can be classified according to the number and nature of their arguments: causative transitive verbs have one

argument denoting an immediate cause and one denoting an entity undergoing a directed change, unergative verbs have a single argument denoting an immediate cause and unaccusative verbs have a single argument denoting an entity undergoing a directed change.[23] Levin and Rappaport Hovav also speak of classes of verbs defined by their thematic properties ("verbs of appearance" (ibid: 19), "verbs of emission" (ibid: 91-92), "verbs of existence" (ibid: 19), "verbs of manner of motion" (ibid: 147-148) etc); as well as sharing the relevant thematic properties, the members of each of these classes are also held to belong to the same event class.

For example, COUGH (145), like other "verbs of bodily process" (ibid: 116), refers to an internally caused event, so the cougher is construed as an immediate cause and linked by the Immediate Cause Linking Rule to the external argument position (and from there to the surface subject). This linking gives COUGH, and the other bodily process verbs, an unergative structure. VANISH (146), like other "verbs of disappearance" (ibid: 153), refers to a change undergone by the single argument, which is therefore linked by the Directed Change Linking Rule to the internal argument position (and from there to the deep object and on to the surface subject). This linking gives VANISH, and the other disappearance verbs, an unaccusative structure.

Levin and Rappaport Hovav's linking mechanism is dealt with in detail in chapter 5.

3.1.3 Class-based approaches to linking: objections to role-based approaches; verb types and constructions; event types

Some writers argue that role-based approaches to argument linking are inherently flawed, and that the basic categories of grammar are classes of predicates, rather than the relationships they support. Croft argues for a model of grammar in which "constructions are the basic units of syntactic representation, and categories [including grammatical relationships] are derived from the constructions in which they appear." (2001: 4).

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[23] For this reason, the analysis appears, superficially, to be a class-based approach. Notice, however, that the linking rules refer to thematic roles, rather than to event classes, event class itself being an argument structure configuration defined by the thematic structure of the verb. Levin and Rappaport Hovav say, for example, "The Immediate Cause Linking Rule will also classify verbs such as *cough*, [...] as unergative" (1995: 137).

Davis and Koenig advance two kinds of argument against role-based approaches (2000: 57-60). First they identify empirical problems with such approaches. In languages that have analytical causative morphology (Davis and Koenig provide examples (151) and (152) from Finnish and Chamorro respectively (ibid: 57-58)), causatives can be made from verbs that already have an agent, leading to possible conflict of priority between the two agents. However, there is never any confusion and in all relevant languages the causer is construed as the primary agent, and linked to the subject position.

(151) Vitsi naura-tt-i nais-i-a.
joke laugh-CAUS-PST woman-PL-PART
'The joke made the women laugh.'

(152) Hu na'-kanta si Pedro.
1SG CAUS-sing Pedro
'I made Pedro sing.'

Other empirical problems involve pairs of verbs with apparently converse mappings. Davis and Koenig provide the examples in (153)-(155) (ibid: 58) to show that verbs that share the same thematic roles can link them to subject and object in opposite ways.

(153) a. Mary owns many books.
b. This book belongs to Mary.

(154) a. We missed the meaning of what he said.
b. The meaning of what he said escaped/eluded us.

(155) a. Oak trees plague/grace/dot the hillsides.
b. The hillsides boast/sport/feature oak trees.

Next, they identify two theoretical objections to role-based theories of linking. These are that there are certain thematic role combinations that do not appear in any language and that there are no rules that refer to thematic roles by their relative position in the hierarchy (only rules referring to specific thematic roles). Both these considerations support the view that predicator classes are ontologically more basic

than the thematic grids they support. Davis and Koenig go on to develop a hierarchical lexicon of word classes, defined in part by their argument-taking properties. Figure 45 shows a portion of such a hierarchy (adapted from ibid: 79). Notice that it makes use of multiple inheritance (Davis and Koenig refer the reader to Carpenter 1992).

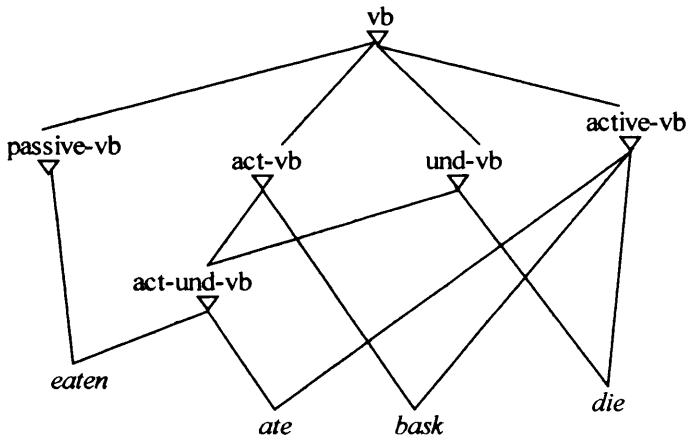

Figure 45 A simple hierarchy of verb types.

The verb classes in the hierarchy define the (syntactic and semantic) argument-taking properties of their members by means of HPSG-style attribute value matrices (Pollard and Sag 1987, 1994). The verbs in the diagram are cross-classified by the argument structure categories **act-vb** (actor verb = verb with an actor) and **und-vb** (undergoer verb = verb with an undergoer) and by the inflectional categories **active-vb** and **passive-vb.**

Similar lexical hierarchies are found in Construction Grammar. Fillmore and Kay (Fillmore and Kay 2000, Fillmore 1997, Kay 1997) also make use of HPSG attribute value matrices, organised into a structured lexicon:

> "The mechanism for shaping sentences is an interconnected repertory of grammatical constructions." (Fillmore 1997: ix).

Goldberg, working in a similar framework, identifies constructions with argument structure templates independent of the lexical structures of individual words. Figure 46 shows the template for indirect object constructions (1995: 142).

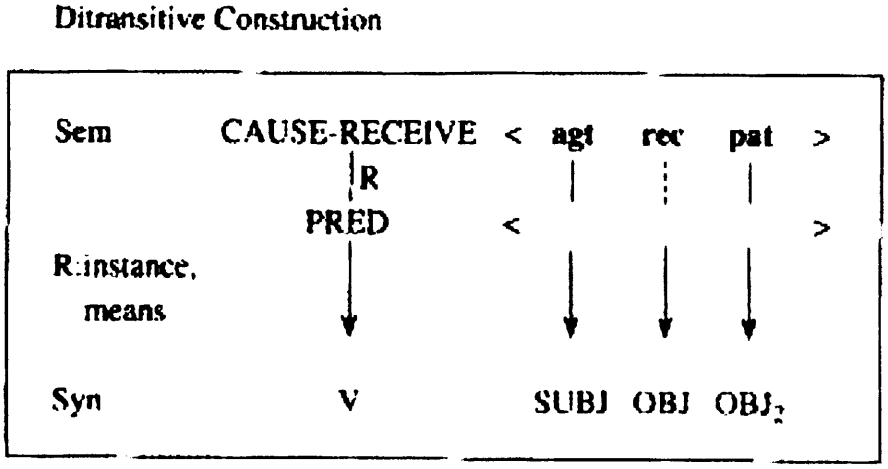

Figure 46 Goldberg's ditransitive template.

The construction has three levels of representation: a semantic level consisting of a predicate with three arguments, an array of participant roles provided by the verb, and a syntactic array consisting of a word class specification with three arguments. The agent and patient roles are obligatorily fused with participant roles of the verb in the middle layer, whereas the recipient may be supplied by the construction; this is shown by the broken line connecting **rec** in the top layer with the second layer (note that this is a specific (ie lexical) property of ditransitives, and is not necessarily general). This is an important property of Goldberg's framework: the argument structures of **constructs** (sentences) are determined in part by the lexical structures of the words in the sentence and in part by those of the constructions invoked.

This separation of verbal and constructional semantic structures is a characteristic of Construction Grammars generally. For Goldberg and for Kay, as for Croft (1990, 2001), the constructional schemas are representations of grammatical structure: they constitute the syntactico-semantic resources of a given language and provide a framework into which the words are inserted:

> "Processes such as those linking grammatical functions with semantic roles are represented as templatic lexical constructions which unify with minimal lexical entries." (Kay 1997: 125)

This view (which I discuss more fully in 3.1.4.3) is particularly important in the treatment of polyvalence, as discussed in chapters 3, 4, and 5.

In other frameworks, however, the constructional schema forms part of the lexical specification of the individual word. In Halliday's Functional Grammar, for example, the inventory of constructions encodes "the different types of process that are built into the grammar of English, and the participant roles associated with each" (1985: 107), and each verb instantiates a particular process type. In the work of Pustejovsky, and others (Briscoe et al. 1993, Pustejovsky 1995, 2001, Pustejovsky and Boguraev 1996a), a predicate has a "deep semantic type", which is associated with a particular argument structure, and it is this argument structure that determines the number and type of the arguments.

Halliday identifies six overlapping **process types** (1985: 106-108): MATERIAL, EXISTENTIAL, RELATIONAL, VERBAL, MENTAL and BEHAVIOURAL. The process types are defined conceptually: in terms of the thematic properties both of the process itself and of the participants. Material processes, for example, involve a (typically animate) ACTOR (linked to the subject relationship) who 'does something directed at' an inanimate GOAL (linked to the object relationship). Material processes are further classified as DISPOSITIVE ('changing') and CREATIVE ('creating').

The core examples of material processes involve human agents acting on solid objects, but Halliday notes that the process may be highly abstract (*resign, dissolve*), and that the more abstract the process is, the harder it is to draw the distinction between actor and goal. Halliday also notes that even with some concrete processes it can be difficult to distinguish actors and goals (ibid: 111). The actor in (156) is involuntary, and so in some respects like a goal.

(156) The tourist collapsed.

Lemmens (1998) develops a model of grammar based on the Functional Grammar that Davidse (1991, 1992) derives from Halliday's framework. Davidse adds to Halliday's transitive process types a further set of **ergative** processes, which are also claimed to be relevant to the grammar of English. In this framework, examples like (156) are structured by the ergative paradigm, which accounts for the difficulty of fitting them into transitive structures.

In Lemmens's model, as in the Construction Grammar accounts discussed above, the constructions have meanings independent of the lexical items that instantiate them. Nevertheless, the event structure of the relevant process type still appears in the lexical specification of an individual word. Figure 47 shows Lemmens's lexical structure for ABORT. Meanings conforming to the transitive model are shown on the right hand side, meanings conforming to the ergative model on the left. The large number (11) of models for the meaning of the verb is necessary under Lemmens's account since, under this account, if a verb is to appear in a particular construction the verb's semantics must be able to unify with the semantics of the construction, so for every construction that a verb can appear there must be a separate sense (model).

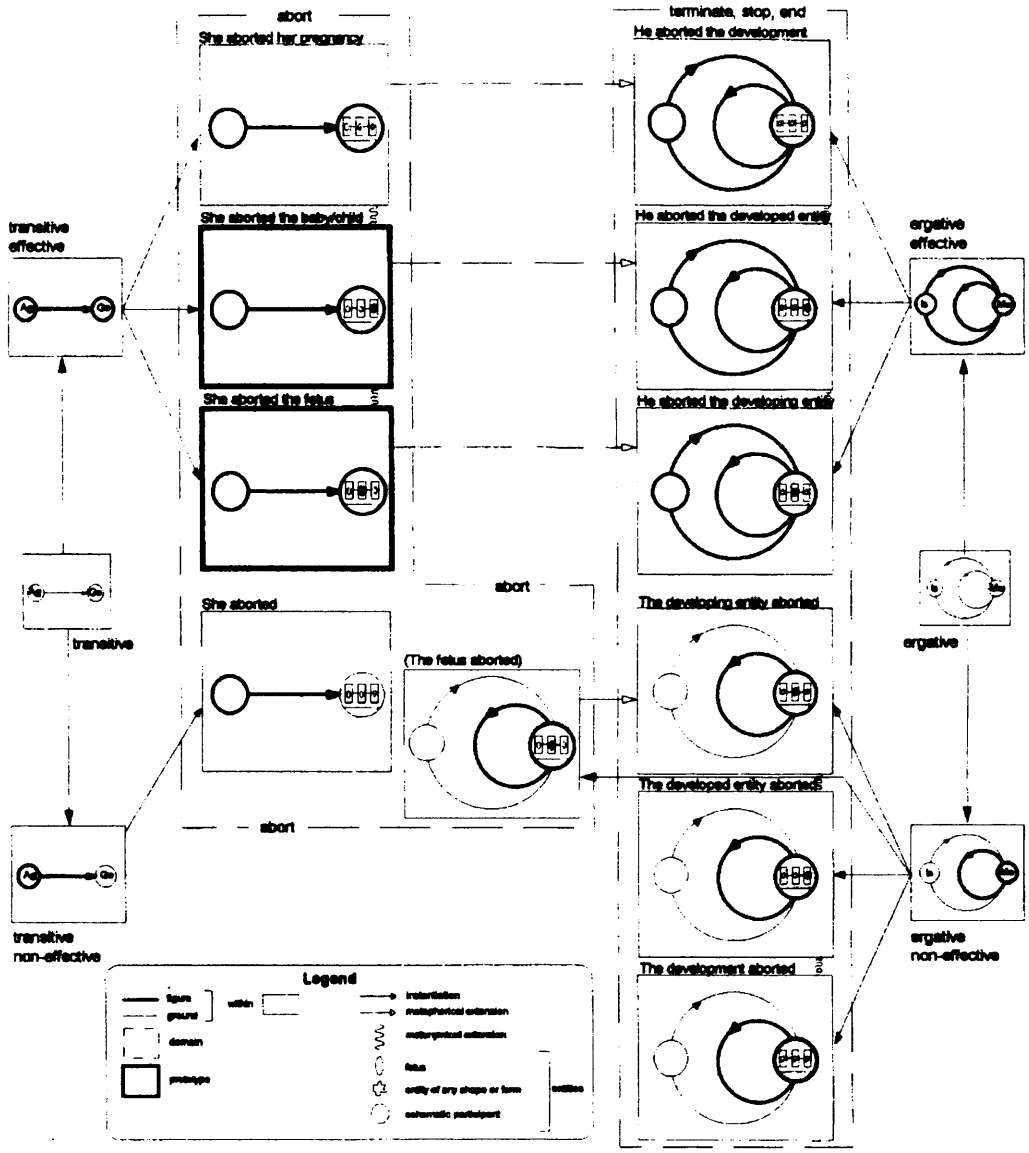

Figure 47 Schematic network of the meanings of *abort* (Lemmens 1998: 217).

Lemmens's framework is discussed at greater length in chapter 5, in particular the transitive and ergative models.

3.1.4 Linking in WG: the framework; event types; roles and relations

3.1.4.1 The framework

In chapter 1 (1.2.4), I described a linking mechanism within the WG framework, based on generalisations over grammatical relations (specialisations of the (Revised) Syntax Semantics Principle). Some of the details were only sketched there, and these are

fleshed out in this section. In this section I also take steps towards placing the WG linking mechanism in the context of the other approaches discussed above.

The linking regularities presented above consist of symbolic structures which link specific syntactic relationships (subject, object, indirect object, etc) with specific semantic relationships (er, ee, recipient, etc). The syntactic relationships are identified by a set of word-level (syntactic, morphological, phonological, etc) properties which, by default, are inherited by all cases of the dependency: unless otherwise specified, subjects precede their parents and determine their form, objects follow and permit no intervening codependents, and so on. The semantic relationships are identified by a set of concept-level (thematic, force-dynamic, etc) properties, which likewise constitute the default model for the relationship. The syntactic and semantic properties taken together constitute the lexical structure of the relevant relationship, and can be seen as a gestalt.

Semantic relationships like recipient and result are quite straightforwardly understood in terms of more complex semantic structures: for example, if a concept C has a result which is an example of Having, then that result's first argument is the recipient of C (note that this property forms part of the definition of both result and recipient). The relationships **er** and **ee**, however, which are linked to subject and object respectively, are less straightforward. An account is provided here in which the properties of ers and ees are defined by a hierarchy of event types (notice that an event type (Having) played a role in the definition of result and recipient).

Since most of these event types are defined by a single exceptional argument relationship, and since the linking regularities are still stated in terms of single roles, the WG approach outlined here combines the properties of role-based and class-based approaches. The linking regularities presented in 1.2 are generalisations over the linking properties of all subjects, objects etc. While each syntactic dependency always maps onto the same semantic argument, the exact nature of the role played by that argument is determined by the wider conceptual structure associated with the parent's sense (as represented partly by its event type). The distinction between words and constructions is an emergent property of the network structure.

The categories in the event type hierarchy are defined by their semantic (conceptual) properties, including force-dynamic properties (but not including

aspectual properties, which are dealt with in the following chapter). Many of the event types function as the senses of words, though some do not. The categories support a number of associations (more at the more specific levels), including those mentioned in the linking regularities. The roles of those arguments are defined by the rest of the conceptual structure associated with the lexical category.

3.1.4.2 Event types

Figure 48 shows the event type hierarchy. The various types are shown, but most of their properties are not (they are given in the following diagrams). The category at the top of the hierarchy is labelled Predicate; this is not an entirely satisfactory name for this concept, but it has the benefit of subsuming both states and events. The names of the concepts in the hierarchy are intended to be the senses of lexical words, and for this reason it is perhaps surprising that no readily useable term exists for the highest category, though it might be argued that this concept does not have much use as an element in the normal use of language. The event type hierarchy should more properly be called the predicate type hierarchy.

Predicates are divided into **states** (State) and **events** (Event), the latter consisting of a series of (more or less) transient states. The most general category, Predicate, is shown with a single argument, labelled **er**, and this association is inherited (implicitly) by the two subclasses. The states are divided into Being and Having; the latter and some of the former have a second argument, labelled **ee**. Further properties of these categories are explored shortly. The events include **processes** like Laughing and Yawning as well as the further categories Becoming and Affecting. The first of these is telic (it has a result which is a state); the second has an ee as well as an er. Affecting includes **transitive processes** like Pushing and Beating ('hitting' not 'defeating') as well as the category Making which subsumes two further categories, Creating, which is telic since its result is an example of Being (or Existing), and Making', which is telic in that its result isa Becoming and the result of this second event is a state (I introduced both these categories in 1.2.4.2).

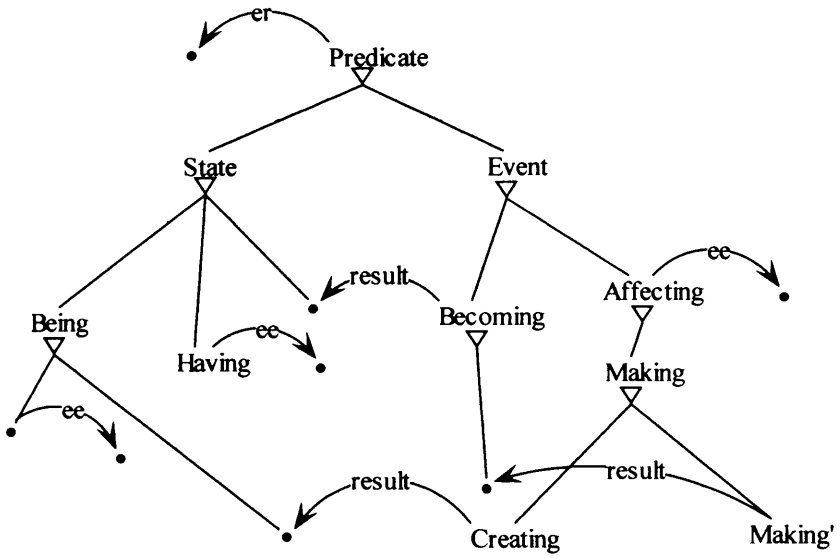

Figure 48 Predicate type hierarchy.

Figure 49 shows in more detail the properties of the states. Being defines a property of its er. For example, Big functions as the size of its er (Drunk is also shown as an example of the way in which the semantic network represents all aspects of meaning). Other subcases of Being include Feeling, which subsumes psychological states (see Figure 50), and At, which subsumes locations (see Figure 51). The inclusion of the traditional semantic roles theme and actor pre-empts the discussion of the difference between Being and Having in Figure 52 and of the relationship between the argument positions and traditional semantic roles in 3.1.4.3.

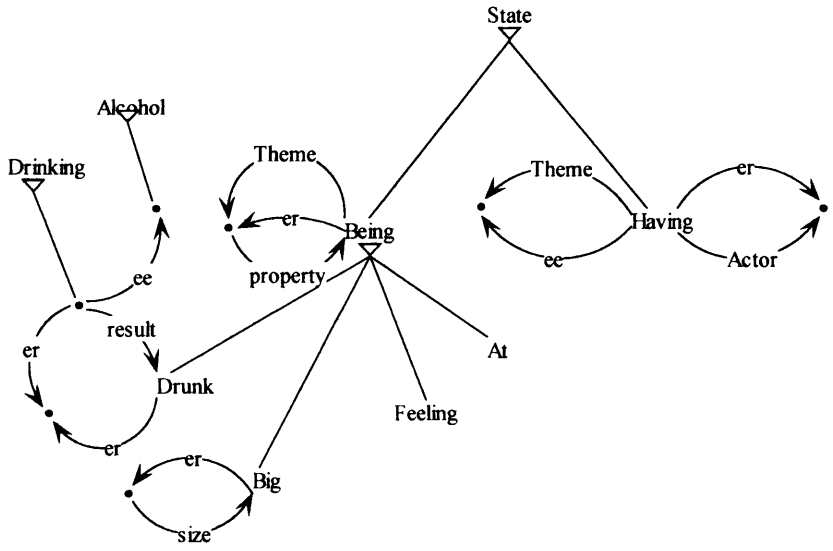

Figure 49 Hierarchy of states.

Figure 50 Shows in more detail the properties of Feeling. This category subsumes one- and two-argument psychological states. In both cases the er must be sentient. One of each kind of state is shown as an example. A single semantic relationship is shown for each; this stands for a fuller characterisation of the words' meanings which would include for example the relationship between Happy and Smiling (the er of Happy is often the er of Smiling too).

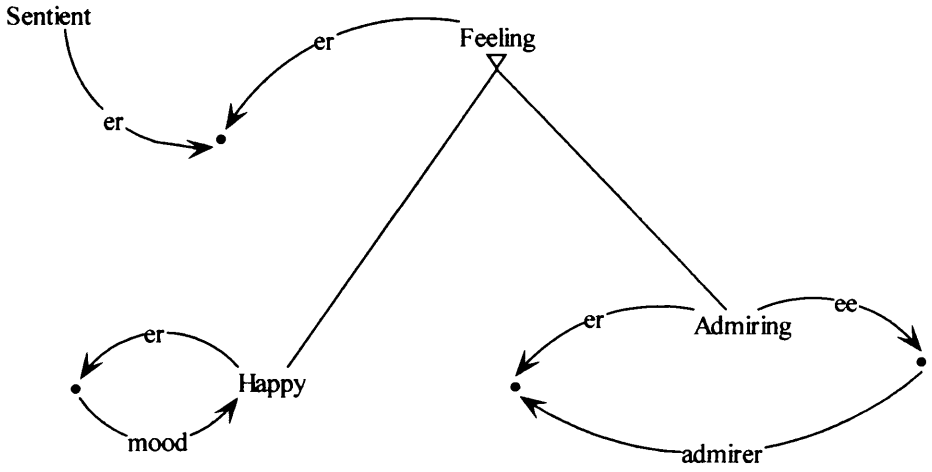

Figure 50 Feeling.

Figure 51 shows the properties of At, the category subsuming locations, and the sense of AT. The ee of At defines the place of its er, which is therefore understood as the theme of a state defined by the ee. For this reason, the ee is also shown as the Landmark (see 3.1.4.3). Two subcases of At are shown, In and On, the senses of the prepositions IN and ON respectively. These two differ from At in that the place of the er is not the same as the ee, but is rather the same as the place of a part of the ee. In the case of In, this part is the interior; in the case of On, it is the surface. The diagram also shows that Containing and Supporting are the converses of In and On respectively (if a is in b then b contains a; if a is on b then b supports a). These facts are integral parts of the meanings of the prepositions.

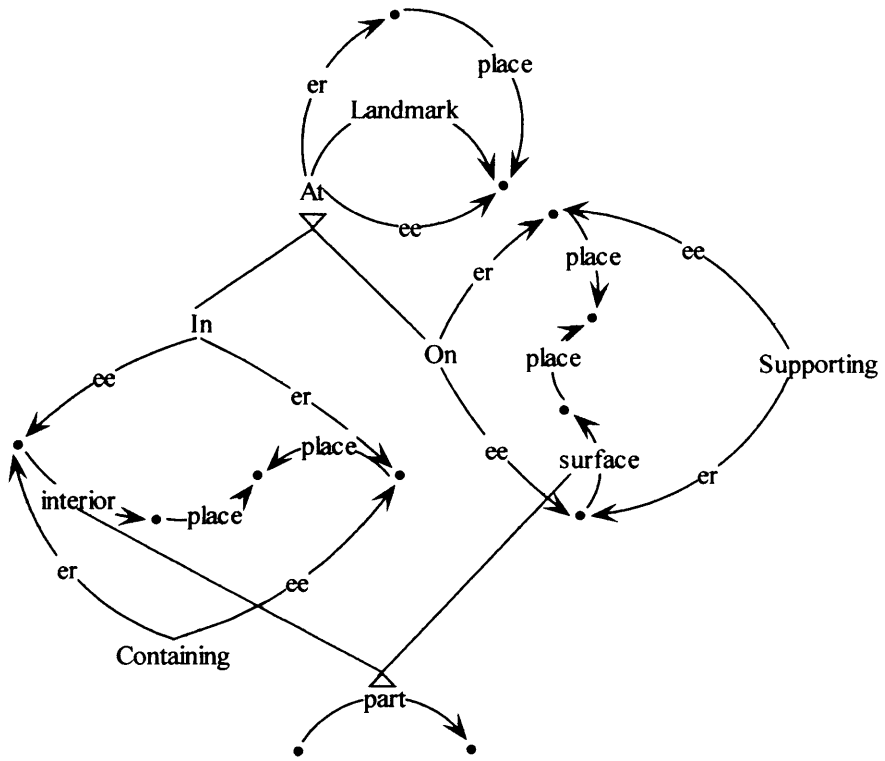

Figure 51 At.

Figure 52 shows the properties of Having, the sense of HAVE. As I show in Figure 49, the arguments of Having and those of Being have different properties. In the case of Having the er is also its actor and the ee its theme (see 3.1.4.3); in the case of Being the er is the theme, and the ee, if there is one, is a landmark, or plays some other role (in the case of the psychological states it is often called a stimulus). Figure 52 shows that Supporting and Containing are subcases of Having (subsumed under a general category labelled 'Locating').

This explains why these categories assign their arguments in the opposite way to the corresponding concepts On and In, which inherit their argument structure from Being (by way of At). It may also help to explain the way in which some languages use verbs corresponding to English BE and HAVE with different sets of verbs in perfect constructions and perhaps also explain the relationship between passive and perfect constructions even in English. This possibility needs to be explored in future work.

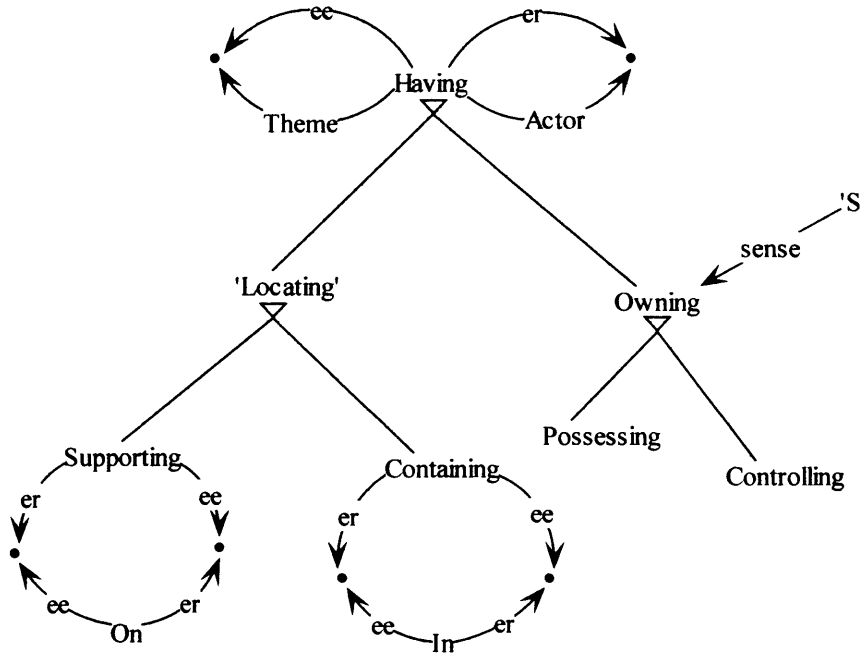

Figure 52 Having.

The correspondence between Being and Having also suggests an alternative to the analyses presented in the previous chapter for verbs like GIVE and the indirect object. I claim above (1.2.4.2, Figure 21) that the more specific semantics of indirect objects overrides the usual principle that the ee of a causative event is assigned as the er of its result (the gift, which is the ee of Giving, is the ee rather than the er of the result, if this is to be a case of Having). However, it is also possible that the result of Giving is instead a case of Being (more specifically, it isa At), which would preserve the default arrangement. This would also provide a means of describing the contrast between verbs like GIVE and those like EQUIP (rare in English) that show the opposite linking arrangement. This view is supported by the prepositions that are used with these verbs. GIVE selects TO (in the absence of an indirect object), which in other constructions refers to a path terminating in a location; EQUIP selects WITH, which has Having as its sense.

This suggestion is sketched in Figure 53. The result of Giving isa At; its er (the thing located) is the ee of Giving and its ee (the location) is the recipient. The result of Equipping isa Having; its er (the possessor) is the ee of Giving and its ee is the 'equipment'.

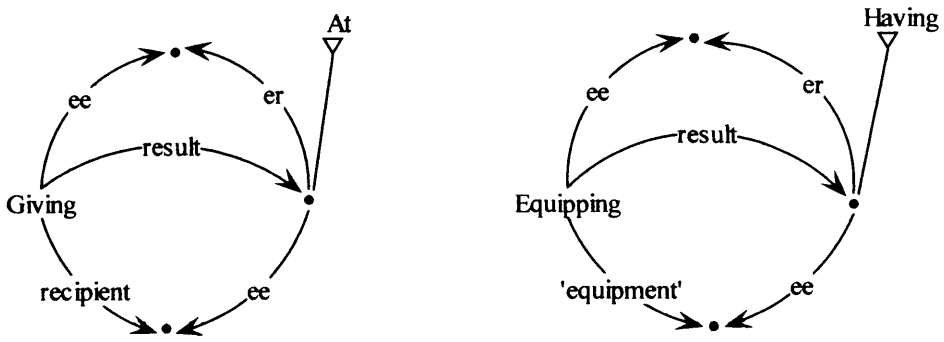

Figure 53 Giving, Equipping.

Figure 54 shows the properties of the non-states. Event inherits the er relationship from the Predicate category, and passes it down to the subclasses. Becoming has additionally a result which is a state which shares its er; the class is telic and provides the semantic schema for unaccusative constructions. Dying is shown as an example (see Figure 58). Affecting has additionally an ee, which is a patient. Pushing is shown as an example (see Figure 56). Making represents telic affective events (it has a result). Two subclasses of Making are shown. Creating provides the model for effective constructions and Making' for causative (affective) ones. In both cases it is the ee that functions as the er of the result. Killing is shown as an example of Making' (see Figure 57).

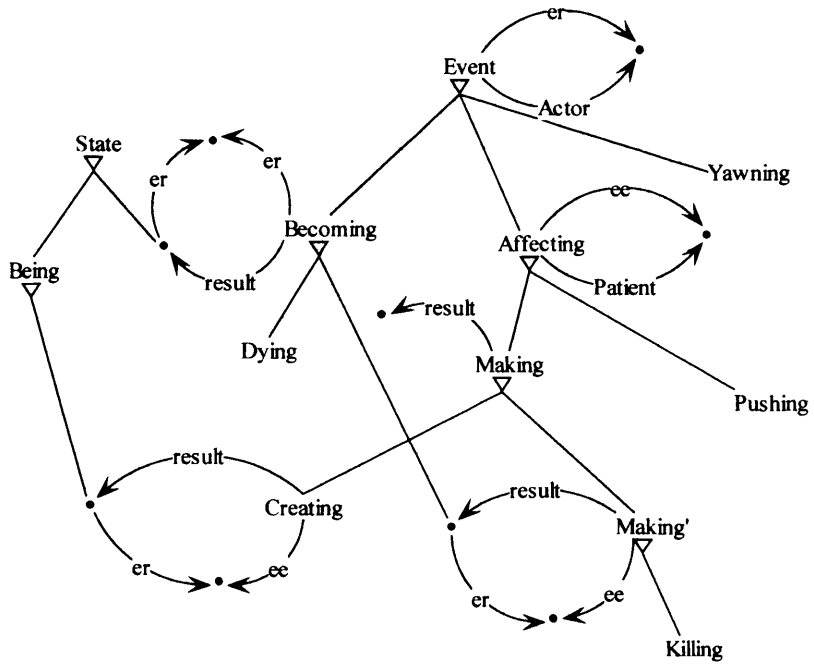

Figure 54 Events.

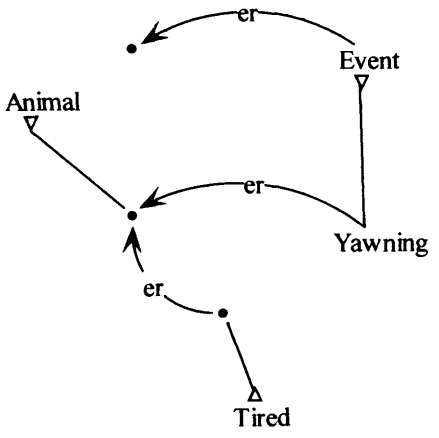

Figure 55 Yawning isa Event.

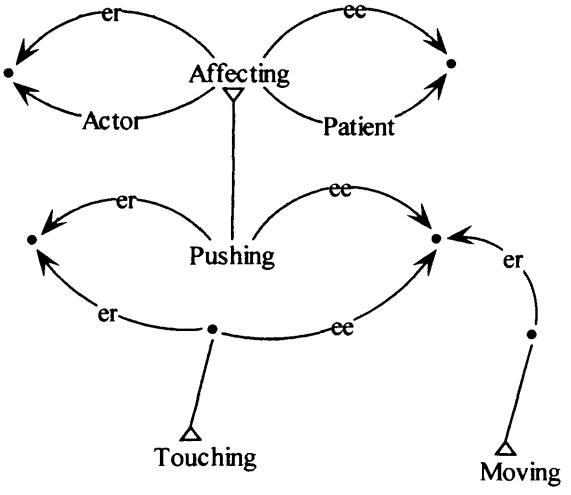

Figure 56 Pushing isa Affecting.

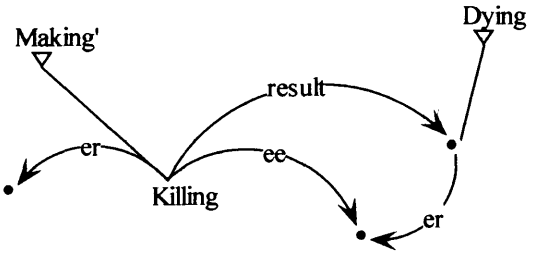

Figure 57 Killing isa Making'.

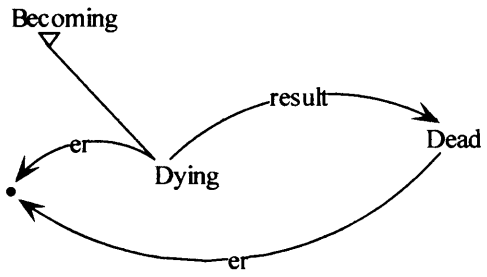

Figure 58 Dying isa Becoming.

3.1.4.3 Semantic roles and semantic relationships

Above I have given a hierarchical classification of predicate types defined by their properties (see Figure 48, Figure 49, Figure 54). Note that the senses of particular words (not just verbs: prepositions and adjectives refer to events, as do some nouns like *destruction, wedding*, etc) are arranged in the same hierarchy since they simply instantiate the more general predicate types. The properties of the predicate types determine the number and nature of the semantic relationships associated with these senses and the linking of those associations to syntactic dependencies; alternatively, the number and nature of semantic associations and the linking of those associations determines the position of the sense in the predicate type hierarchy.

In chapter 1 I provide linking regularities that link more or less schematic semantic associations with more or less schematic syntactic ones. There I give linking rules for subject (1.2.4.3), object (1.2.4.2) and indirect object (1.2.3.3, 1.2.4.2) as well as the more general (revised) syntax semantics principle (RSSP); elsewhere I give a linking rule for **sharer** (a kind of complement, see chapter 4). The semantic associations referred to in these rules are the same as those supported by the various predicate types. In fact the linking rules themselves form part of this hierarchy, appearing at the highest relevant level.

As noted above (3.1.4.1), semantic associations like result and recipient are fairly straightforwardly characterised in terms of other semantic relationships (in terms of their meanings) but er and ee, the two relationships involved in subject and object linking, are not. The ers and ees of particular events (or event classes) are instantiations of the more general er and ee that appear in the linking regularities (note that the er of Predicate (Figure 54) is the most general one there is, so this is the locus

of the subject linking rule and all other ers are instantiations of this one). The properties of ers and ees of more specific categories are determined at the appropriate level in the predicate type hierarchy and it is here that the most semantic information is found.

In the preceding section I define the semantics of these relationships by relating them to named thematic roles (**actor**, **patient**, **theme**, **landmark**), but this begs the question in the absence of a fuller semantic definition of these roles. Indeed, as discussed below, once the thematic roles have definitions, it may no longer be necessary, or desirable, to keep the relationships agent, theme etc in lexical structure.[24]

Some of the problems with thematic roles have already been identified (see Dowty's objections discussed in 3.1.2). The most immediate practical difficulty is that different writers (and even different works by the same writer) use the same terms with different meanings; this is a particular problem for the terms Goal, Patient and Theme (see below).

A further, theoretical, difficulty (raised by Dowty) is the open-ended nature of the set of roles to be used. Goldberg considers this only an empirical problem, since in principle the set of thematic roles need not be finite, the nature of the roles being determined by the set of predicate types recognised in the language:

> "[P]hrasal constructions that capture argument structure generalisations have argument roles associated with them; these often correspond roughly to traditional thematic roles .... At the same time, because they are defined in terms of the semantic requirements of particular constructions, argument roles in this framework are more specific and numerous than traditional thematic roles." (2002: 342)

Since the semantic relationships supported by the senses of words instantiate (isa) those of more general categories, the senses of different words (or constructions) may elaborate the more general models in different ways, so that the set of thematic roles at the more specific levels can be very large indeed. In Figure 54, I used the thematic role **actor** as schematic over the first arguments of all non-states (including processes (157) and causative (158) and unaccusative (159) events).

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[24] Of course, if a particular speaker knows the words ACTOR and THEME (as metalinguistic terms), then they must have these relationships in their lexicon, since they are (or should be!) the meanings of the relevant terms.

(157) a. The flag fluttered in the breeze.

b. The tourist yawned.

c. The flag distracted the tourist.

d. Perry pushed a pea with his nose.

(158) a. Perry pushed a pea to Peterborough.

b. The flag angered the tourist.

c. The judges made a cake.

d. Perry opened a bottle.

(159) a. The pea vanished.

b. The ice melted.

c. The band disbanded.

Trask defines **actor** as "that argument NP exercising the highest degree of independent action in the clause." (1993: 6), noting that this is a simple extension of the category agent to fit other kinds of subject-linked arguments. This extension covers verbs referring to changes undergone by their single argument (unaccusative verbs), whose arguments therefore may have few or no agentive properties (note however, that some are agents (159)c). In fact, the actors of other one- or two-argument events are also not agents ((157)a, (157)c, (158)b).

Agency is a property of some actors, determined by the thematic properties of the event, so the thematic role agent ("the semantic role borne by an NP which is perceived as the conscious instigator of an action" ibid: 11) is not called for. Actor, then, corresponds roughly to Dowty's (1991) proto-agent: it is defined by properties like volitional involvement, causal instigation etc but not all cases share all these properties. Dowty's proto-agent wills the event, is sentient, causes an event or change of state, moves and has independent existence; the WG treatment presented here accepts all of these but the fourth, movement.

Patient ("the semantic role borne by an NP which expresses the entity undergoing an action" Trask (1993: 202)) is schematic over the second argument of transitive events. Affecting, which is the most general such event, subsumes processes (like pushing a pea or patting a dog) and causative events (like pushing a pea to Peterborough or angering a tourist). The patient is the affected (or effected) argument,

even in some of the transitive processes. Processes have a temporal profile that consists of a set of repeated events (see 4.1.2.2). These events may themselves be causative (Pushing consists of a set of repeated causative actions on an object), though they may also be states (Patting consists of a set of repeated locative states) in which case the patient is the theme of the state (see below).

Dowty's (1991) proto-patient undergoes a change of state, is an incremental theme, is causally affected by another participant, does not move and does not have independent existence. Again, the WG analysis accepts all these but the fourth, concerning movement. The incremental theme is a product of the aspectual structure of affective events (see 4.1.2.6).

States have **themes**, and some have actors. Actors of states share the properties of those of non-states. The theme is the argument that the state is predicated of (theme is also used with similar meaning as the name of a discourse function, where it contrasts with rheme, as topic does with comment). Trask gives "an entity which is in a state or a location or which is undergoing motion" (1993: 278), a definition which subsumes some patients, as defined above; Trask also notes that the terms theme and patient are used more or less interchangeably. However, in the current framework the two are separate: patients undergo some affective/effective process or change; themes have some stable property. Locative states also have a **landmark**: the argument whose position defines that of the theme.

The above definitions of the thematic roles are given in terms of semantic properties. For example, an actor wills the event, is sentient, causes an event or change of state and has independent existence. These semantic properties of actor are shown in Figure 59.

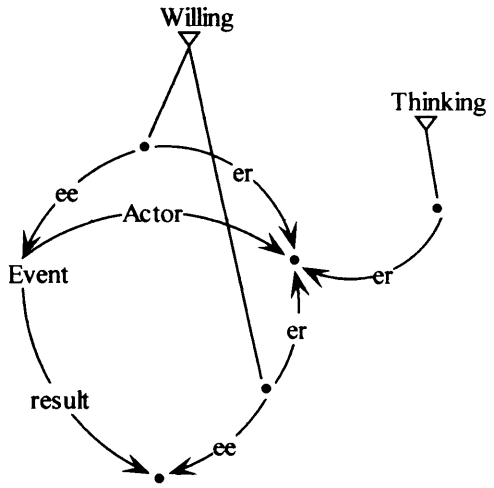

Figure 59 Actor.

In the linking framework outlined here, syntactic associations are linked to semantic ones in a regular way (subjects refer to ers, objects to ees, indirect objects to beneficiaries etc), and those semantic associations are defined by (structural) semantic properties. The relationships er and ee are defined by the categories of the predicate type hierarchy, and linked there to the various properties of actors, patients, themes and landmarks, like those in Figure 59. It is an empirical question whether it is necessary to keep hold of the relationships actor, patient etc: theoretically the ers of non-states could simply be linked directly to the structure shown in Figure 59 without the mediation of the actor relationship. In this and the following chapters some evidence is presented that the thematic roles do appear in the lexicon.

The contrast between Having and Being (the former has an actor-er and a theme-ee, the latter a theme-er and in some cases a landmark-ee, see Figure 49) demonstrates that er and ee are distinct from the thematic roles. This separation of properties is found in other frameworks also. As noted above (3.1.3), for example, in Goldberg's (2002) Construction Grammar the lexical structures of grammatical constructions are separated from those of specific words. Semantic relationships like Actor, Theme etc (**participant roles**), which are supported by the senses of words, instantiate the **argument roles** of phrasal constructions (these correspond to my er and ee), which are therefore schematic over them. The separation, in lexical structure and in the structures of sentences (constructs), of the two argument structures allows

different verbs to elaborate different constructions differently: the argument structure of the construction may add or take away participant roles from the verb, or vice versa.

The WG framework, however, represents the distinction differently: rather than being properties of two different kinds of elements, the participant roles and the argument roles are simply different kinds of association supported by the same elements (events). This property of the WG framework is crucial in the treatment of specific examples in this and the following chapters, since it becomes clear there that both words and constructions may select both argument and participant roles.

Since the participant roles are defined in terms of sets of default properties, it is possible for more than one argument of a verb's sense to fit the bill for one or other participant role. This is the case for the verbs SPRAY and LOAD. As is well known, these two verbs can be used with objects referring to a thing or substance moved or to the place it is moved to. These two possibilities reflect two ways of interpreting the roles of the participants (of choosing which participant best fits the patient model, and is therefore linked to ee and thence to object).

In these cases the lexical properties of the syntactic relationship (here object) can be added to those of the verb. Where the two are not in conflict, they are simply merged. For example, since LOAD does not select either of its non-subject arguments as an incremental theme, this property is assigned to the object-linked argument by the semantics of the ee relationship (160) (the mechanics of this example are discussed in 4.1.2.6).

(160) a. Larry loaded *(the) lorries with (the) lollies in 2 hours.

b. Larry loaded *(the) lollies on (the) lorries in 2 hours.

When there is a conflict between the lexical properties of the construction and those of the verb, the construct is (usually) rendered incoherent. The two examples in (161) are unacceptable because the lexical structure of POUR specifies that the ee of its sense is a liquid (that is how the manner of pouring is defined) and that of COVER specifies that the ee of the sense ends up underneath something. These two requirements clash with the semantics of the construction.

(161) a. *Polly poured the pot with water

b. *Corrie covered the quilt over the baby.

More examples of interactions between the lexical structures of the various elements within a sentence (construct) are given in the following chapters. In the following section I sketch WG analyses for the examples given above in (131)-(136), and in the next part (3.2) I investigate verbs of motion, giving particular attention to their linking properties, considering the linking of their subjects and objects and of other dependencies (prepositional complements and adjuncts).

3.1.5 The return of the great white hunter

At the beginning of this chapter I introduced some examples to illustrate the challenges faced by an account of linking. These examples are dealt with here:

The challenge I set above was to explain how the referents of the dependents of the verbs in (162)a and b are assigned their semantic roles, including how both refer to the death of a gazelle.

(162) a. The gazelle choked to death.

b. The hyena choked the gazelle to death.

The explanation is that the referents of the verbs in (162) are examples of Making' and Becoming respectively. The simplest account for this is that the verb CHOKE must be able to have more than one sense: it is polysemous. Under this explanation CHOKE has one causative sense and one unaccusative sense, which is the result of the former (it is possible that two sub-lexemes are involved). The details of this kind of polysemy are explored in 5.2. The expression *to death* in both of these examples defines the result of the Becoming event. The details of resultative expressions are explored in 4.2.

Next, I must explain the difference between the roles of the referents of the subjects in (162) and (163)a, and explain the unacceptability of (163)b.

(163) a. The hyena laughed.

b. *The gazelle laughed the hyena.

Laughing is an event without a (lexical) result and this accounts for the difference in the interpretation of its subject: the thematic properties of the ers of causative and unaccusative events are not shared by other kinds of event. In chapter 5 I give an analysis of the variation in (162) that requires that participating verbs should have resultative senses, which LAUGH lacks, which then rules out (163)b.

The examples in (164) and (165) are dealt with in the following part of this chapter, where I explain the pattern in terms of the interaction of verbal and prepositional semantics.

(164) a. The great white hunter drove on the river bed.
b. The great white hunter drove onto the river bed.
(165) a. The great white hunter went on the river bed.
b. The great white hunter went onto the river bed.

The pattern in (166) was discussed above (1.2.3.3).

(166) a. The medicine man gave the hunter a charm.
b. The medicine man made the hunter a charm.

I offer no explanation for the pattern in (167), except to say (as I did above) that it appears to involve two alternative senses of the verb.

(167) a. The medicine man made the hunter (into) a god.
b. The medicine man made the lion's claw *(into) a charm.

3.2 Verbs of motion

3.2.1 Properties of verbs of motion: linking of subjects and objects; linking of prepositional complements; resultative expressions; aspectual properties

In this part of the chapter I describe the behaviour of verbs of motion. This provides an opportunity to demonstrate the properties of the WG linking mechanism described above. The linking properties of verbs of motion are particularly interesting because

they can conflate agency and affectedness (changing position) and because they exercise varying control over prepositions and other adverbial elements other than subject and object. The discussion of verbs of motion in this chapter also prefigures some of the treatment of specific data in the following chapters.

As I show, a variety of verbs are used in constructions referring to motion events. As I also show, not all of these verbs behave alike, or appear in like constructions, but I nevertheless use the term **verb of motion** to describe them all collectively. Some of the verbs of motion are discussed in depth here.

In discussing the similarities and differences between the various verbs of motion, and the similarities in the behaviour of certain of these verbs and other verbs not involving motion, I am able to shed light on the nature of the semantic properties that determine how the verbs behave. By showing that the verbs of motion can be classified aspectually according to the same parameters as are responsible for the aspectual classification of non-motion verbs (see 1.2.3.2, chapter 4), I demonstrate that the contribution of the lexical semantics of these verbs to their syntactic behaviour is controlled by these general parameters (eg **telicity**), rather than by their semantic field. This supports Croft's claim (1990: 53, discussed in chapter 5) that syntactic behaviour is affected by **predicate type** (force-dynamic properties) but not by **event class** (thematic properties).

However, I also show that some of the properties of the verbs of motion derive from the nature of the activities and events they profile (the nature of motion itself), which contradicts this claim by demonstrating that thematic properties still have a part to play. For example, the lexically resultative verbs SEND and LAND do not have stative passive uses, unlike other lexically resultative verbs which do (see 4.2.2, 5.2.3.5):

(168) Wait until the ice has been/is completely frozen before attempting to cross.
(169) Wait until the message has been /*is completely sent before disconnecting the modem.
(170) Wait until the helicopter has been/*is completely landed before attempting to disembark.

I argue below that this does not show that Landing is not a telic event (doesn't have a result), rather that its result (being on the ground) is not distinctive in that there is no difference between being on the ground as a result of landing and being on the ground for whatever other reason. A similar argument is advanced in 4.2.2 and in 5.2.3.5 to account for the absence of unaccusative uses of some causative verbs.

The linking of verbs of motion is interesting because of the wide range of constructions that they support. The subject may refer to an agent who acts on some other entity causing it to move (171) (some of these cases are further complicated by the "accompanied causation" constraint identified by Levin (1991: 31), see below 5.2.1.4); or it may refer to a (sometimes agentive) entity that changes its place ((172) and (173)). The object, if there is one, may refer to a (usually passive) entity changing its place (171) or to the distance traversed (173) (or to an obstacle or other point on a path: *jump the wall*, *cross the bridge*). In some verbs of motion, the entity which is changing its location usually participates in an activity which causes the motion. In ((171)a, b) Rollo and the barrel respectively move by turning over a horizontal axis, and similarly in ((172)a, b), but the (c) examples are different in that the cuboid moves by virtue of the rolling of some other element (the wheels of the trolley).

(171) a. Roddy rolled Rollo (down the stairs).

b. Roddy rolled (out) the barrel.

c. Roddy rolled the cuboid across the desk (on a trolley).

(172) a. Rollo rolled (down the stairs).

b. The barrel rolled (out).

c. The cuboid rolled across the desk (on a trolley).

(173) a. Wally walked the streets.

b. *The streets walked.

I also consider in this chapter the linking of dependents other than subject and object. Verbs of motion often appear with prepositional or other adverbials referring to properties of the movement (like the path), and as I show here the different verbs of motion do this in different ways. Some are selected by the verb and their contribution to the structures of sentences is therefore determined by the lexical structure of the

verb; others are able to affect the structure of the sentence in a more radical way, as outlined below (3.2.3.1).

The treatment of path and result expressions with verbs of motion feeds into the treatment of resultative expressions in 4.2. I argue that (spatial) resultative expressions with verbs of motion are just a subset of resultative expressions more generally. I also show that some single-argument verbs of motion tolerate resultative constructions of two kinds, selected and non-selected (174), and that the same is true of some two-argument verbs of motion ((175) and (176)).

(174) a. Jimmy jumped clear of the falling debris.

b. Whenever he feels bad, Jimmy just jumps himself jolly.

(175) a. Sooty swept the crumbs off the floor.

b. Sooty swept the path clear.

c. Sooty swept himself exhausted/the bristles off the broom.

(176) a. Laurie loaded the lolly on the lorry.

b. Laurie loaded the lorry full.

c. Laurie loaded herself exhausted/her back sore.

In chapter 4 I also discuss verbs of motion with respect to their aspectual properties. Some verbs referring to motion events (like ARRIVE) are necessarily telic while others (like STROLL) clearly profile processes and still others (eg COME and to a lesser extent RISE) share some behaviour with both telic and non-telic verbs ((177) and (178)). The details of these examples are discussed in the following section and in chapter 4.

(177) a. Harry arrived in an hour. ['succeeded in arriving']

b. Cathy came in an hour. ['began/succeeded in coming']

c. Stacey strolled in an hour. ['began strolling']

d. Rosie rose in an hour. ['began rising']

(178) a. Harry arrived for an hour. ['arrived and stayed an hour']

b. Cathy came for an hour. ['came and stayed an hour']

c. Stacey strolled for an hour. ['passed an hour in strolling']

d. Rosie rose for an hour. ['passed an hour in rising']

In chapter 5, I show that some verbs of motion are able to appear in both causative and unaccusative constructions (under appropriate circumstances) ((179) and (180)). There are also verbs of motion that can appear only in one or only in the other of these constructions ((181) and (182)).

(179) a. Jenny jumped (out (of) the window/up and down).

b. Jenny jumped the horse/*her husband ?(out (of) the window/*up and down).

(180) a. Wally walked (to the Wal-Mart/up and down).

b. Wally walked the wardrobe/Wendy ?(to the Wal-Mart/up and down)

(181) a. Cathy came (out of the box).

b. *Carlos came Cathy (out of the box).

(182) a. *The ha'penny shoved (into the end zone).

b. Shelley shoved the ha'penny (into the end zone).

I address some of the issues raised above in the remainder of this chapter. First I look at two ways of classifying verbs of motion: according to the number of arguments (into transitive and intransitive verbs of motion); and into four classes according to specific features of their thematic structure which affect their behaviour with respect to constructions like those just identified. I explain and justify this classification in terms of the WG lexical structures of the verbs.

The four classes are distinguished from each other by their behaviour, and by the WG lexical structures presented in the following section, but it must be borne in mind that the classes are not internally homogeneous. For example, as noted above ((179)b, (180)b) (and discussed in chapter 5), JUMP and WALK (both 'manner of motion verbs') differ as to their ability to be used in causative constructions without path expressions. At one level of analysis these differences within classes are ignored for expository purposes; they must nevertheless be dealt with at another level, partly in order to preserve the claim that there is some semantic feature shared by the verbs in question, and partly for themselves, since it is part of my goal to identify the thematic properties that distinguish the meanings of words from each other.

In the course of the discussion I present the WG structures of the relevant verbs and constructions, developing a classification of (English) lexical structures referring to motion events. There I address the specific issues raised above and in the other chapters about the behaviour of these verbs with respect to resultative, causative and unaccusative constructions and address their aspectual and linking properties.

3.2.2 Classification of verbs of motion: one and two argument verbs of motion; manner, path and result

I note above that the verbs of motion do not share all their properties. Verbs of motion can be classified in (at least) two ways: according to the number of their arguments into transitive and intransitive verbs of motion; and according to their thematic (conceptual) properties into manner verbs, path verbs etc. I address these classifications in order.

3.2.2.1 Transitive and intransitive verbs of motion

Intransitive verbs of motion (LAND, GO, RISE, CYCLE, etc) appear with subjects referring to a moving entity. The referent of the subject may have many agentive properties (LAND, GO, CYCLE), but it need not. In Rising, for example, the referent of the subject need have no particular properties at all. Other verbs make very specific demands on the argument. These are chiefly manner verbs (see below), since in many cases the specified manner makes intrinsic reference to specific properties of the agent. Walking, for example, presupposes at least two legs and Galloping presupposes at least four (if it does not demand that its argument be a horse, though cf *Dick Turpin galloped past the inn*). Ambling specifies manner, gait and mental state (relaxed): ?*The string puppet ambled out of the booth.*

As well as exercising semantic control over the moving argument, some also specify properties of the movement: the speed (RUSH, PLUMMET), the path (RISE, BOUNCE) or other spatial properties (LAND, SPLASHDOWN) etc.

Some of these verbs have transitive uses (*Larry landed the plane*, *Rocky rolled the barrel*), where the subject refers to a causing agent and the moving argument is the referent of the object (though it is in some cases implicit that the referent of the subject also moves, as discussed below: *Wally walked Wanda to the Wal-Mart*).

Most of the transitive verbs of motion have the same interpretation: the subject refers to an agent causing the movement of the referent of the object; again the agent may or may not move along with the other argument. These include verbs like POCKET, SEND, RAISE and CARRY. They exercise semantic control over either or both of the arguments as well as properties of the movement as with the intransitive verbs. Some have intransitive uses.

There is a further, small, set of transitive verbs of motion (FOLLOW, STALK, RIDE (*We rode the wave into the harbour*)) where both arguments necessarily move. These verbs differ from the other transitive verbs in that the direction and pace of the movement are determined by the referent of the object (if you stalk a stag, you must go where the stag chooses), though some assign some agentive properties to the referent of the subject (*McKay escorted the prisoner into the waiting prison van*).

3.2.2.2 Path and manner

It is common to divide verbs of motion into path and manner verbs. This classification is found, for example, in Hoekstra (1984), Talmy (1975, 1985) and in Levin (1993) and Levin and Rappaport Hovav (1995) where the classes are called "verbs of inherently directed motion" and "verbs of manner of motion" respectively. Levin's verbs of inherently directed motion include ADVANCE, ARRIVE, COME, EXIT and RISE (1993: 263) and her manner of motion verbs include (nonagentive) FLOAT, ROLL and SLIDE and (agentive) FROLIC, WADDLE and WALK (ibid: 264-267).

Shortly I offer a classification in terms of two properties that divides verbs of motion into more than two classes, but first I give a brief account of the distinction given in Levin and Rappaport Hovav (1995).

Levin and Rappaport Hovav claim that the first class (the inherently directed verbs, which profile a directed change in their single argument) are unaccusative whereas the second class (the manner verbs, which do not) are unergative (in Levin and Rappaport Hovav only the intransitive verbs are treated as verbs of motion) (ibid: 146-148). The manner verbs, however, have a special property, which is that they may be used with a "directional phrase" (ibid: 183) ((183), (184)), and that they are unaccusative when used in this directed sense (ibid: 185).

(183) The raft floated onto the rocks.
(184) Wally waddled into work.

Levin and Rappaport Hovav offer the following evidence. In (some) languages where there is a choice of auxiliaries in perfect tenses, the BE equivalent is used, instead of the default HAVE, when the direction phrase is present ((185) shows an example from Dutch) (ibid: 184);

(185) Willy heeft gewiebeld/is naar het kantoor gewiebeld.
Willy has wobbled /is to the office wobbled

In English, manner verbs can be used with resultative expressions predicated of the subject (186) or of a non-selected object (187) (ibid: 186-187). Levin and Rappaport Hovav point out that only a very limited class of adjectives or other "directional elements" (APART, TOGETHER, AWAY, etc) can appear in constructions like (186), and that they must be able to refer to a (change of) location, but there are no semantic constraints on the kind of construction seen in (187).

(186) Darcy danced free of the trap.
(187) Darcy danced herself dizzy/her pumps to shreds.

Finally, the manner verbs have (in some cases limited) causative transitive uses as in (188), (189). The fact that these cases have causative uses is taken to indicate that they are unaccusative in their intransitive use, and it is for this reason that they (mostly) require the direction phrase in the causative use: it is this that makes them unaccusative in the first place (ibid: 188).

(188) Gary galloped the horse for 2 hours.
(189) The scientists ran the mouse *(round the maze).

3.2.2.3 Manner, path and result

In this section I develop an alternative thematic classification of verbs of motion, based on the semantic relationships manner, path and result. I present relevant examples and sketch an account for them using these three relationships.

Non-selected resultative expressions (resultative expressions predicated of non-lexical arguments, see 4.2.2.3) do select among the verbs of motion in the way that Levin and Rappaport Hovav (1995) claim ((190)-(193)). The manner verbs allow non-selected resultative expressions predicated of a reflexive dummy object, or of a full object; none of the other verbs do.

(190) Sally cycled herself fit/the wheels off her bike.
(191) *The sun rose itself visible/the valley lighter
(192) *Cassie came herself breathless/the party complete.
(193) *Andy arrived himself happy/the meeting quorate.

However, they can all appear with a selected resultative expression (one referring to a (change of) location). And the selection of the resultative expression divides the verbs of motion in a different way:

(194) a. Julie cycled in the circus. [not resultative: 'Julie cycled while in the circus']
b. Julie cycled into the circus.
c. Julie cycled clear.
(195) a. The sun rose in the sky. [not resultative: 'the sun rose while in the sky']
b. The sun rose into the sky.
c. The sun rose clear of the trees.
(196) a. Cassie came in the room.
b. Cassie came into the room.
c. Cassie came away.
(197) a. Andy arrived in the boardroom.
b. *Andy arrived into the boardroom.[25]

[25] It is true that guards on British trains commonly say things like *We will shortly be arriving into London Euston*, which contradicts what I say about these verbs throughout this chapter. It is not clear to

c. Andy and Sandy arrived together. [not resultative: 'they arrived at the same time']

Spatial IN receives a locative interpretation when it appears with CYCLE and RISE ((194)a and (195)a refer to cycling event contained by the circus and a rising event contained by the sky respectively), but with COME and ARRIVE it receives a resultative interpretation (the mover ends up in the relevant location in (196)a and (197)a). COME can also be used with INTO, where it receives a similar interpretation, as can CYCLE and RISE, but ARRIVE cannot be used with INTO at all (197)b. Similarly, only the first three can be used with non-prepositional resultatives.

Finally, the aspectual properties of these verbs also separate CYCLE and RISE from COME and ARRIVE. The first two refer to unbounded events in the absence of a path expression, or other delimiter, whereas the last two refer to bounded events even in the absence of a delimiter ((198)-(201), this test for boundedness was introduced above (1.2.3.2) and is discussed at length in the following chapter).

(198) a. Sally cycled for/*in two hours.
b. Sally cycled into town for/in two hours.
(199) a. The balloon rose for/*in two hours.
b. The balloon rose into the sky for/in two hours.
(200) Cassie came (into the room) for/in two hours.
(201) Andy arrived (in the room) for/in two hours.

The preposition IN, in this use, refers to the length of time it took to complete some bounded event, which is why it is incompatible with the unbounded events in (198)a and (199)a (in the following chapter I note that there is a possible interpretation for these examples, where the preposition refers to the length of time it took for the event to (be) start(ed)). The preposition FOR, in this use, refers to the duration of some unbounded event or state; in (198)a and (199)a it refers to the duration of the activity

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me what this usage signifies, but it may be related to the use of the progressive in these cases. Note that station announcements are typically of the form *The next train to arrive at platform 4....*

(event) referred to by the verb; in all other cases it refers to the duration of the final (result) state.

The facts in (200) and (201) suggest that the lexical semantic structures of COME and ARRIVE include a result, which is a location. This view is supported also by the data in (194)-(197): only these two cause locative IN to be interpreted as a result.

The data in (194)-(197) also suggest that the lexical structures of the three verbs CYCLE, RISE and COME include (or can include) a path and that that of ARRIVE does not: INTO refers to a path, identified by its end point so its referent can fill the path slot for the first three, and is incompatible with the last.

The behaviour of CYCLE and RISE in (198)b and (199)b suggests that when the senses of these verbs are provided with a path specifying an end point they receive a result at the same time (when the preposition is present, they behave just like the resultative verbs in the other two examples). This follows from the nature of the path relationship. When an event has a path, it is bounded by that path (to the extent that the path is bounded): the end of the path is the end of the event. In the case of the verbs of motion, where there is a causal relationship between the motion event and the traversing of the path, the end of the path is therefore the result of the motion event. The relevant lexical structures are given below.

In the light of this, the data in (190)-(193) (particularly (190)) seem rather confusing: if cycling has a path (and therefore an implicit spatial result), then why does CYCLE permit non-spatial resultative expressions? The answer to this question (again, given in more detail below) is that cycling does not necessarily have a path. Cycling, by itself, is an activity which can be undertaken for purposes of fitness, enjoyment etc, or for no purpose at all. Nevertheless, there is a strong association between cycling and motion (because there is a strong association between bicycles and motion), which is realised in a (lexical) subclass of cycling which does have a path; this subclass has more general Cycling as its manner. So the verbs in (190) and (198)b have, in fact, different senses one of which is a subset of the other. See Hudson and Holmes (2000) for a detailed analysis of the various uses of the verb CYCLE.

The examples given in this section separate all four verbs from each other in one way or another, as do the explanations I have offered. The differences are as follows: CYCLE refers to an undirected activity, a salient subclass of which has a path

like the directed motion verbs; RISE refers to a (not inherently bounded) event, defined by its path; COME refers to an event with a path which is also bounded by the presence of a result; ARRIVE refers to a simple resultative event. We should also expect to find verbs with both manner and path, and with manner and result, and perhaps even with all three. PLUMMET provides a possible example of the first, SCARPER of the second and PLUNGE of the third.

The transitive verbs of motion can be classified, thematically, according to the same principles:

(202) Shorty shovelled the coal in(to) the hole/his hands raw.

(203) Maisy lifted Eddie in(to) the loft/*her back sore.

(204) Timmy took his anaconda in(to) the pool/*the swimmers uneasy.

(205) Penny penned the sheep in(*to) the yard/*herself exhausted.

The relationship between the one and two argument verbs of motion is explored in the following section.

3.2.3 Linking properties of verbs of motion: manner, path and result

The linking properties of these groups of verbs are, like the linking properties of all words, determined by properties of their meanings. Above I showed that the semantic relationships result, path and manner classify the verbs of motion into the relevant classes. It should be clear, however, that not all the members of each class behave in the same way in all cases.

For example, the three manner verbs SHOVEL, BOUNCE and SLITHER differ as to whether they can be used in one or two argument constructions. SHOVEL, which refers to an activity defined by the instrument, cannot be used in unaccusative constructions and SLITHER, which refers to an activity defined by the mover, cannot be used in transitive constructions. These contrast with BOUNCE, which refers to an activity defined in terms of properties of the path and can be used in both transitive and intransitive constructions. In this way, the thematic properties of the verbs serve to further subdivide the class of manner verbs.

In the rest of this section I deal with the four classes of verb of motion in turn, looking at their linking properties. I investigate how specific thematic properties affect the selection of subjects, objects and various prepositional complements and adjuncts.

3.2.3.1 Manner of motion verbs

The manner of motion verbs form a very large set (I estimate that there are over 400 in Levin 1993): the range of things that can be implicated in motion is very wide. Because of the sheer size of the set, and its heterogeneity, the members exhibit a range of linking properties. The manner verbs are distinguished by their thematic content (the **constant**, in terms of the predicate argument approach to semantic structure discussed in 2.2.1.1). More specifically, they are distinguished by particular thematic properties of particular elements of the argument structure. Some (like SCHLEP) refer to properties of the causing agent; some (like SHOVEL) refer to properties of the instrument; some (like FLUTTER) refer to properties of the motion; and some (like SLOSH) refer to properties of the moving element. These four groups are dealt with in turn:

- **causer selecting verbs**

(206) CARRY, PUSH, SCHLEP, KICK, TOSS, LOB.[26]

These verbs are defined in terms of properties of the causer of their sense. Carrying and Pushing specify particular physical activities that the causer must engage in; Schlepping additionally implies the causer's attitude to the relevant physical activity; Kicking, Tossing and Lobbing refer to particular limbs, as well as to specific activities involving them.

None of these verbs can be used in unaccusative constructions, presumably because of the requirements placed on the causer. They permit spatial (ie semantically selected, see 4.2.2) resultative expressions predicated of the mover (the referent of the object) (207); to the extent that they can be used intransitively with understood objects (which is not great), they also permit non-selected resultative expressions predicated of non-selected objects (208).

[26] Most of the verbs named in this section are collected from Levin (1993). The classification is mostly my own.

(207) Jonny kicked the ball between the posts.

(208) Jonny kicked himself silly/England into the record books.

Many belong to other thematic classes, because of the same properties that qualify them for membership here. For example, KICK can also be used as a "verb of contact" in the same constructions as HIT.

Figure 60 shows a partial lexical structure for CARRY. The sense, Carrying, has an er and an ee. The er must hold the ee and move. All the manner of motion verbs entail an example of Moving in their semantic structures. Moving itself has a path, so these verb senses implicitly inherit the path from above. The consequences of this for the linking properties of these verbs are explored above. Moving itself has no result but, again as explored above, when the path is defined by an end point, this location is construed as the result of the motion event. The parts of the path (the parts of a path are locations: isa At) share their er with the er of the moving.

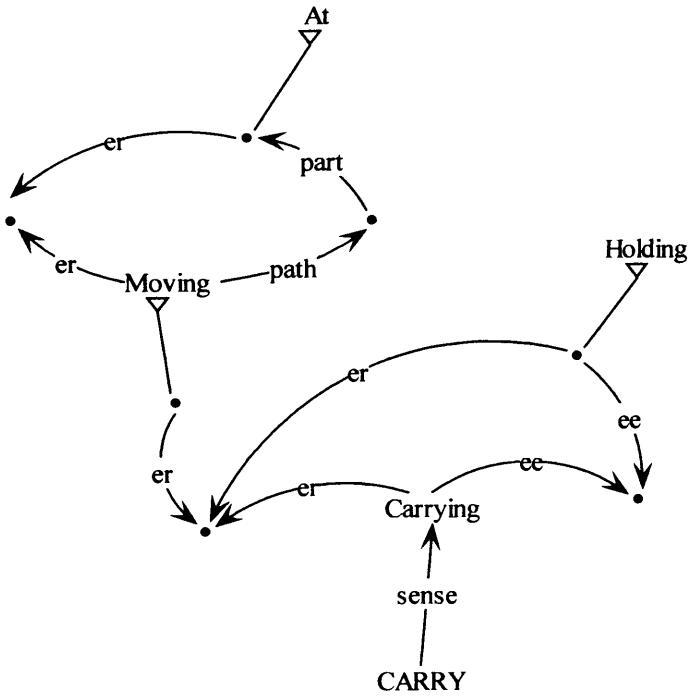

Figure 60 CARRY.

➢ **instrument selecting verbs**

(209) BRUSH, CART, CYCLE, PUNT, ROW, SCRAPE, SCRATCH, SHOVEL, WHEEL, YACHT.

These verbs are defined in terms of the properties of the instrument of their sense; many are named after (share their form with a noun referring to) the relevant instrument. They can be used in causative and unaccusative constructions, depending on the nature of the instrument (Shovelling is necessarily causative; Punting can be causative or unaccusative; Yachting can only be unaccusative). Both kinds permit resultative expressions predicated of the mover (*shovel coal into the hole, yacht over to Cowes*).

Again, to the extent that they can be used with understood objects, they also permit non-selected resultative expressions: *shovel yourself sore/the handle off the spade*. Related to this possibility is the fact that some of these verbs additionally permit resultative expressions predicated of a landmark (the place the mover moves to or from: *brush the stones with/free of sand, shovel the hole full/clear of coal*). The use of the prepositions WITH and OF in these examples matches their use in constructions with verbs like FILL and EMPTY.

Figure 61 shows a partial lexical structure for PUNT (in fact for the verb PUNT/v and the related noun PUNT/n). The sense, Punting, has an er who stands in a punt and uses a pole with the result that both punter and punt move (this is shown by a set comprising two separate motion events), which is also the purpose of Punting. The semantic structure does not specify which moving entity is the ee (it is vague in this regard) so the same structure allows for both causative and unaccusative uses (*punt into the lagoon/punt the barge along the tunnel*).

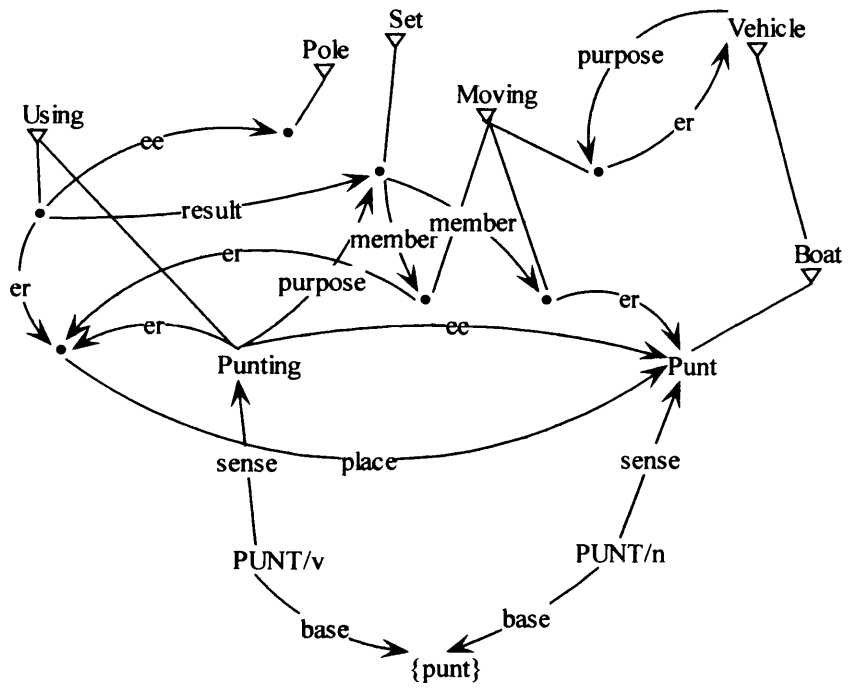

Figure 61 PUNT.

➢ **motion selecting verbs**

(210) BOUNCE, FLOAT, FLUTTER, ROLL, SLIDE, WOBBLE, DAWDLE, BUZZ, ZOOM.

These verbs are defined in terms of properties of the movement itself. Relevant properties include the trajectory (BOUNCE), the pace (DAWDLE) and an accompanying noise (BUZZ). All can appear in unaccusative constructions (*A butterfly fluttered by*), and many can appear in causative constructions too (*Zadie zoomed the plane over the rooftops*), though some make additional demands on the mover (the er of Dawdling has a specific attitude to the movement; that of Fluttering has specific physical properties), and these are excluded in causative constructions.

Both causative and unaccusative uses support resultative expressions predicated of the mover (*Felicity floated the frigate/The frigate floated free of the reef*). None of these verbs supports landmark resultatives (**The storm floated the harbour full of jellyfish*), though some allow non-selected resultative expressions (*roll yourself sick/the carpet bare*). Some verbs (eg WOBBLE) refer to movement internal to the mover, and to this extent they approximate to the verbs in the following category.

Figure 62 shows a partial lexical structure for DAWDLE. Dawdling is a kind of moving; the speed is slow; the dawdler is relaxed and one person's dawdling results in someone else's impatience.

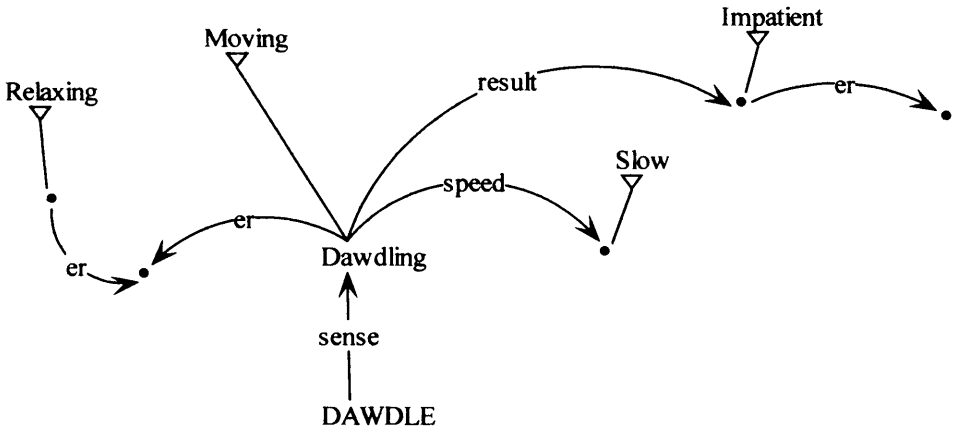

Figure 62 DAWDLE

➢ **mover selecting verbs**

(211) BACKPACK, CRAWL, CYCLE, DANCE, GALLOP, SLITHER, STOMP, WALK, DRIBBLE, DRIZZLE, SLOSH.

These verbs are defined in terms of properties of the moving argument. Crawling and Walking specify physical activities; Backpacking, Dancing and Stomping additionally specify social or attitudinal properties; Galloping selects a particular species (or genus?); Slithering specifies physical properties of the mover (slimy), as do Dribbling and Sloshing (liquid).

All verbs have unaccusative uses (*backpack round Europe*) and some have causative uses (*gallop Silver into the corral*), though (as before) some make such specific demands on the mover that this possibility is excluded (CRAWL, SLITHER, STOMP). All support mover resultative expressions. Some additionally support landmark resultative expressions (*drizzle the avocado with oil*). They do not readily permit non-selected resultatives.

Figure 63 shows a partial lexical structure for GALLOP, which is polysemous (it has two senses, see chapter 5). The sense Galloping/c is a causative event whose result isa (unaccusative) Galloping. The er of Galloping is a horse and steps with each of its

four legs in turn in a specific order. I do not show all the part relationships between the er and its legs, or between the Galloping and its parts (the steps) since they would render the diagram practically unreadable.

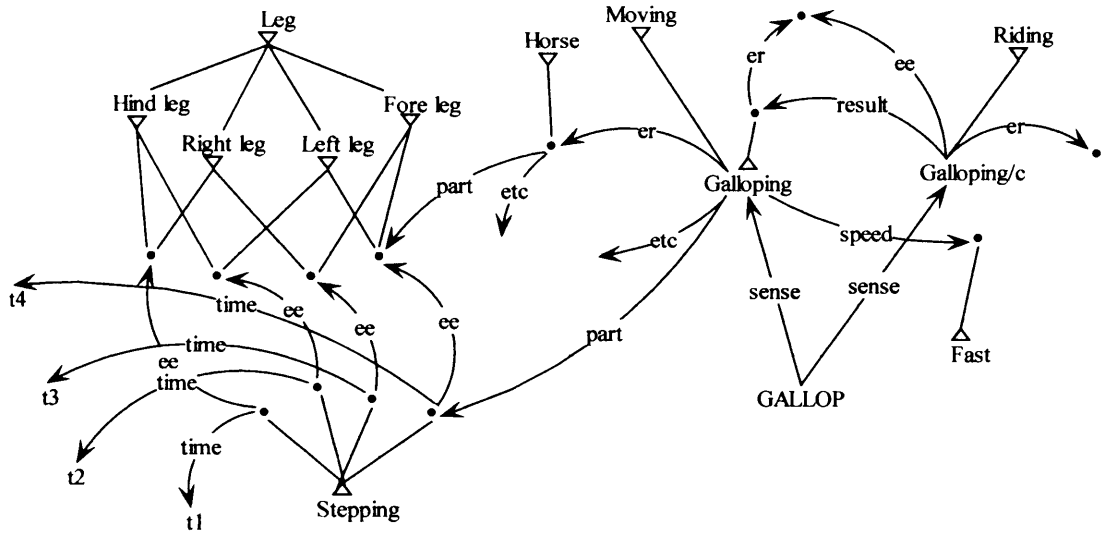

Figure 63 GALLOP

3.2.3.2 Path verbs

(212) DROP, HOIST, LIFT, LOWER, RAISE. (Levin 1993: 114)

ADVANCE, ASCEND, CLIMB, DESCEND, MEANDER, PLUMMET, PLUNGE, RECEDE, RISE, SOAR, TUMBLE. (selected from ibid: 263; I have added PLUMMET and SOAR)

The path verbs form a small set in English ((212) contains all the examples to be found in Levin (1993)). Most seem to refer to vertical paths. The path verbs can be divided into transitive (causative) and intransitive (unaccusative) classes, since none of them can be used in both constructions (causative PLUNGE seems to be a resultative path verb, like those in the next section). Both kinds support mover resultative expressions; none supports non-selected resultative expressions.

Some of these verbs can be used with an object referring to a landmark (*climb the stairs*), after the model of those other verbs like CROSS, PASS and ROUND, for which this is the usual linking arrangement. Note that the referent of the object is not perceived as affected in these cases (they do not support landmark resultatives).

Figure 64 shows a partial lexical structure for RISE. Rising has an er and a path, which is defined in terms of two parts, one of which is higher than the other and has a later time. The parts of the path have the same er as the rising (see Figure 60).

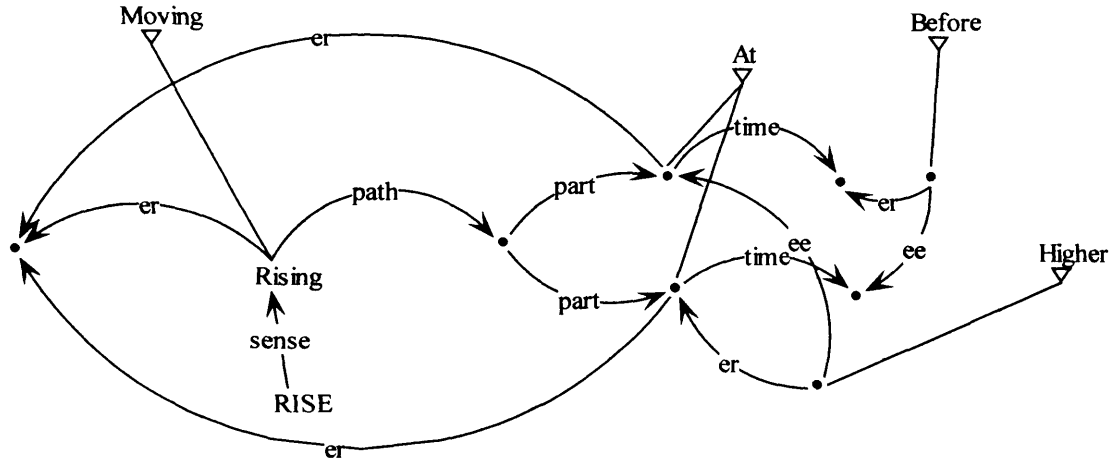

Figure 64 RISE

Because their semantics contains a path, these verbs combine readily with prepositions like INTO that profile paths; if the preposition refers to a bounded path the combined interpretation is a telic one. Since the path is unbounded, these verbs do not, by themselves, have telic interpretations however, and they also do not support resultative use of prepositions referring to locations.

3.2.3.3 Path and result verbs

(213) COME, GO. BRING, TAKE, CRAM, LOAD, SCATTER, SPRAY.

These verbs are essentially like the path verbs (they are also divided into causative and unaccusative, the latter represented only by COME and GO), with the added property that they refer to bounded events. This is because the path in their lexical semantic structure is defined in terms of its end. The end of the path may be determined deictically (COME, BRING) or by some specification of the effect on the mover (SCATTER) or the landmark (CRAM). This last group has the same linking properties as the verbs like FILL. Many verbs can be used with both mover and landmark resultative expressions (*cram the currants in the bag/the bag with currants*).

Figure 65 shows a partial lexical structure for SCATTER. The verb has two senses: causative Scattering (*Scooby scattered snacks on the stage/the stage with snacks*) and unaccusative Scattering/u (*The gang scattered when the police arrived*). Scattering/u has a result, which is the same as the end of its path: a set of locations, with a large size, all of whose members are on the same surface (the properties of sets, and their effects on verbal semantics, are explored in the following chapter (4.1.2.1)). The unaccusative sense also has an er, which is the same as the er of (the members of) the result, but the causative sense does not specify whether the mover or the surface it moves to is to be construed as the ee. Like punting (see Figure 61), causative scattering is vague in this regard.

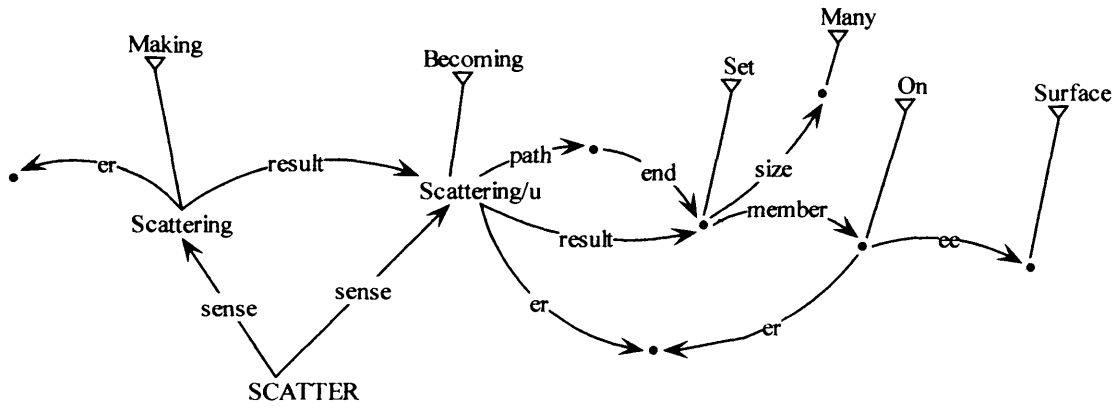

Figure 65 SCATTER

As observed above, these verbs support spatial resultatives referring to the path (*into*) and to the end of the path (*in*). These are always predicated of the mover, be it the referent of the subject or of the object. Because the result is built into the meaning of the verb, they do not permit non-selected resultatives.

3.2.3.4 Result verbs

(214) ARRIVE, DEPART, RETURN, INSERT, ESCAPE, LEAVE, LAND, (DIS)LODGE, CORRAL, JAIL, PEN, POCKET, DRAW (a sword), OUST, REMOVE.

These verbs are defined solely in terms of their results: the mover arrives at a location. Some are deictic, and others select particular properties of their landmarks (LAND, POCKET); some make additional demands on the mover (CORRAL, DRAW, JAIL, PEN). The deictics are either exclusively unaccusative or exclusively causative (with

the exception of RETURN), but those that select landmarks may appear in either construction. The large set of verbs that select movers are all named after ways of containing or controlling the mover, and these appear only in causative constructions.

Many permit mover resultatives, referring to a location as opposed to a path. In some cases, the lexical structure is so specific about the nature of the location that a resultative expression would be pleonastic (**pocket it in a pocket*) (see 4.2.2.1).

There is a further class of resultative verbs that refer to the posture or attitude of the mover in the result state (these can usually also be used in stative constructions), including HANG, LIE, LAY, STAND, COIL and LOOP; some of these are discussed below (5.2.1.3).

Figure 66 shows a partial lexical structure for JAIL. Jailing has a result which isa In. Its er is the ee of Jailing and its ee (landmark) isa Jail, the sense of the noun JAIL/n. The verb can be used with a direct object referring to the ee, and may additionally take a resultative expression that refers to a specialisation of the concept Jail (*They jailed Jamie in Pentonville*). With or without the resultative expression, the interpretation is telic.

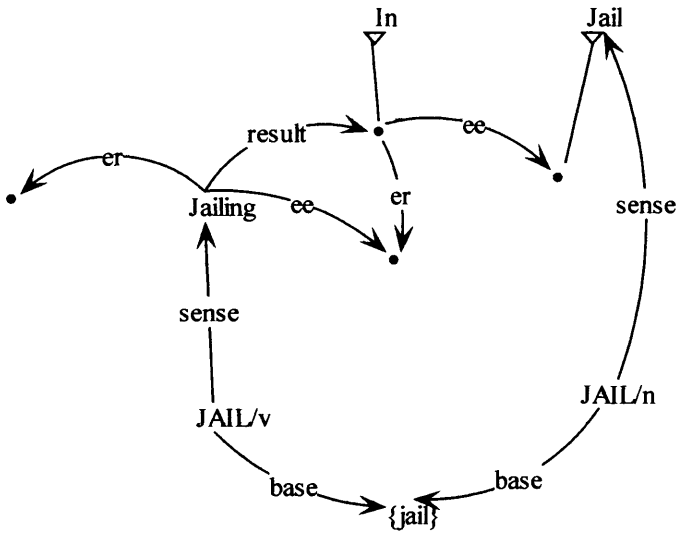

Figure 66 JAIL

3.3 Summary

In the second part of this chapter I have presented some ways of classifying verbs of motion, according to transitivity and according to thematic properties, and I have

identified three thematic properties that provide for an alternative classification. I have looked at the linking properties of the verbs of motion so classified and discussed how these are affected by the thematic properties.

Transitivity in verbs of motion depends on one of two properties: for some (the deictics like COME and BRING) it is simply determined lexically; for others (those that select thematic properties of some participant) it is a consequence of thematic structure (arguments whose properties are selected are generally obligatory). The moving participant may be the referent of the subject or of the object; in the latter case the subject refers to a participant which causes (or is instrumental in) the movement (and may also move in doing so). Because of the agentive properties of referents of subjects (see above), when the subject refers to the mover it is common (though not obligatory) for the mover to be construed also as a causer. In some cases, the movement can be construed as affecting the landmark, in which case the verb can also appear with an object referring to that landmark.

The thematic properties of the verbs of motion also select specific prepositions, or specific interpretations of prepositions: those that have results impose a resultative interpretation on locative prepositions like IN, and they also select particular kinds of result (*insert in*, *remove from*); those that have paths permit prepositions referring to those paths (INTO, ALONG etc); those that can refer to movements affecting the landmark can appear with a preposition like WITH or OF whose complement refers to the argument that moves in relation to that landmark.

The linking framework I have outlined in this chapter has a number of properties. It permits some syntactic dependencies to be predicted on the basis of specific force-dynamic and thematic properties and provides a framework for accounting for variable behaviour on the basis of the same properties. In this framework the range of thematic relationships is in principle unlimited, as is the range of event types. The multiplicity of thematic relationships is reconciled with the categorical demands of syntax by means of the semantic relationships er and ee, which collect together the various properties associated with the referents of subjects and objects respectively in what are effectively prototype categories (in the sense of Taylor 1995, 1998).

For the sake of comparison, Jackendoff's approach to this same problem, as outlined above, is to admit an open ended list of thematic roles and link them to syntactic dependencies using variable linking rules; in Dowty's approach, again as outlined above, the various thematic properties are collected together into two prototypes; Levin and Rappaport Hovav explicitly exclude thematic properties from affecting argument linking, recognising instead only a limited number of semantic roles defined in terms of argument structure; Davis and Koenig, Lemmens and Goldberg all allow a range of thematic roles, as determined by the event classes, which also determine their linking properties. The WG framework presented here obviously has much in common with Dowty's framework, though it shares with the class-based approaches the close relationship between event and role type.

4. Aspect and Resultative Expressions.

In this chapter I investigate the properties of **aspect**. Aspect is a classification of the meanings of utterances according to the temporal structure of the profiled event; the aspectual classes, as defined by Vendler (1967) and Croft (1998b), are introduced in the first section. The interpretation of an utterance is determined by a range of factors, including the linguistic and non-linguistic context, and in this chapter I look in particular at the properties of lexemes and of their linguistic contexts that affect the aspectual interpretation of utterances. A number of specific words and constructions are known to have aspectual properties (for example, progressive constructions refer to processes, the parent of temporal IN refers to a bounded event), and these can serve as diagnostics for the aspectual properties of verbs appearing in these constructions or alongside these words but they can also serve to explain changes in the interpretations of verbs brought about by the aspectual expression itself.

In the second half I look at a construction with a specific aspectual interpretation, the **resultative construction**. I show that the construction, which has a telic interpretation, can be used with lexically telic verbs (4.2.2.1), in which case they refer to the result built into the meaning of the verb, and with lexically non-telic verbs (4.2.2.2, 4.2.2.3), in which case they constrain the interpretation of the verb by adding a result to its meaning. I provide a WG account of the structure of resultative expressions which proposes a resultative construction that can be used with non-resultative verbs and which matches the resultative portions of the structures of resultative verbs. On the way I consider some existing treatments of resultative expressions, including those framed in terms of syntactic **unaccusativity**.

4.1 Aspect: aspectual class; aspect in WG; aspect and the event type hierarchy

4.1.1 Aspectual classes: accomplishments, achievements and states

Vendler (1967) identifies four aspectually defined classes of event: **activity, accomplishment**, **achievement** and **state**. The identification of the classes derives from contrasts in the compatibility of members of each class with constructions that also refer to the aspectual properties of the event.

Activities and accomplishments are distinguished from achievements and states by the fact that the first two have internal structure (they have parts which are separate

events). This difference is reflected in their compatibility with progressive (215) and simple (216) present constructions (ibid: 99). The present progressive refers to an event that forms part of an ongoing activity, and so is only compatible with those events that have internal structure (215). The simple present refers to an undivided state of affairs that holds at a (definite or indefinite) point in time, so it is compatible with states ((216)d) and with activities and accomplishments only when these are construed as states (a common outcome is that they receive a habitual interpretation) ((216)a,b). The use of achievement words in simple present constructions ((216)c) is discussed below ((231), 4.1.2.5).

(215) a. I am pushing a pea.
b. I am killing a king.
c. *I am recognising your mother.
d. *I am knowing a good joke.

(216) a. I push peas.
b. I kill kings.
c. I recognise your mother.
d. I know a good joke.

Activities and accomplishments are distinguished from each other by the fact that the latter are inherently bounded. Vendler demonstrates this by combining each aspectual class with expressions referring to the duration of a process and the completion of an action ((217)-(221)) and by considering the entailments of each in progressive constructions ((222)-(224) these examples adapted from ibid: 100-101).

(217) How long did you push the pea for?
(218) *How long did it take you to push the pea?
(219) *How long did you kill the king for?
(220) How long did it take you to kill the king?
(221) I killed him/*pushed it in seven minutes.
(222) a. I am pushing a pea.
b. I have pushed a pea.

(223) a. I am killing the king.

b. I have killed the king.

(224) a. I am pushing a pea to Peterborough.

b. I have pushed a pea to Peterborough.

- The preposition FOR refers to the duration of an event: it imposes boundaries on an otherwise unbounded process. Pushing a pea is not inherently bounded (there is no specified completion), and so FOR can be used to set the boundaries (217); killing a king is, however, inherently bounded (it ends with the death of the king), so FOR cannot be used in this way (219).
- Expressions like *How long did it take* ((218), (220)) and some using IN (221) refer to the extent of an already bounded process so they are compatible with, bounded, accomplishments (220) but not with, unbounded, activities (218).
- As well as being unbounded, activities are internally homogeneous (all parts are alike). When a activity is used in a progressive construction, it refers to part of an ongoing event, any part of which counts as an example of the same activity. It follows from this that if someone is engaged in an activity then they have been engaged in it for some time ((222)a entails (222)b).
- Since they have defined end points (which necessarily differ from other preceding stages), accomplishments are not internally homogeneous:

  "they also go on in time, but they proceed towards a terminus which is logically necessary to being what they are" (ibid: 101).

  When an accomplishment is used in a progressive construction, it refers again to part of an ongoing event, but one where the parts of the event do not all count as examples of the same event (all parts before the end lack the end). It follows from this that if someone is engaged in an accomplishment they cannot yet be said to have accomplished it ((223)a does not entail (223)b). Notice that the same effect is achieved when an end point is added to the verb by some other construction ((224)a does not entail (224)b).

Achievements and states are both incompatible with progressive constructions, as noted above, because they do not have internal structure. An achievement consists of a single transition occurring at a point in time; a state consists of a stable situation

that extends indefinitely through time: "achievements occur at a single moment, while states last for a period of time" (ibid: 103). Achievement words can be used alongside temporal expressions referring to points in time (225); state words (like activity words) can be used alongside expressions setting the temporal bounds of the state (226).

(225) At which moment did you recognise her mother?
(226) How long have you known that joke?

On the difference between accomplishments and achievements, Vendler notes (ibid: 103-104) that, while the latter cannot appear in progressive constructions ((215)c), because they refer to single moments in time, they can nevertheless be used with expressions referring to the length of time the event took to be completed:

(227) How long did it take you to recognise my mother?
(228) Miss Marple found the clue in five minutes.

Here, the period referred to is the time taken before the event itself occurred. (227) is enquiring after the length of time that the hearer did not recognise the mother; (228) refers to the length of time Miss Marple spent looking for the clue. Croft (1998b: 74) calls these 'run-up achievements'. Vendler notes that they differ from similar constructions with accomplishment words in that the event cannot be said to be (or have been) taking place during the run-up period:

> "[I]f I write a letter in an hour [writing a letter is an accomplishment], then I can say *I am writing a letter* at any time during that hour; but if it takes three hours to reach the top [reaching the top is an achievement], I cannot say *I am reaching the top* at any moment of that period." (1967: 104, my italics)

Croft (1998b) is more specific about the interaction between the aspectual properties of individual verbs and those of constructions, and classifies verbs according to their interpretations, rather than according to the constructions they can appear in (ibid: 73-74). He identifies a number of constructions that have aspectual properties ("aspectual grammatical constructions" ibid: 70-71), the simple present (*I play*), the present progressive (*I am playing*), the 'container adverbial' (*in five minutes*),

the 'durative adverbial' (*for five minutes*), 'punctual adverbials' like SUDDENLY, the adverb ALMOST, 'prospective' *be about to*, and 'conative' *try to*; and four classes of event denoted by verbs, states, point states, processes and achievements, defined by whether they involve change and whether they extend in time. He shows how the interpretation of the various constructions is affected by the event structures of different verbs.

States (including 'point states' like *being on time* which are true only at a single moment) do not involve change. Non-states are divided into processes (*writing letters*), which extend in time, and achievements (*shattering a window*), which do not; some processes (the accomplishments) are also telic (naturally bounded) (*writing three letters*).

Like Vendler, Croft notes that the simple present is used to refer to ongoing states (those that are true at the time of speaking). When the verb lexically denotes a state, this is straightforward (229) (many of these examples are from Croft); when the verb denotes a process or achievement, the event must be somehow construed as a state, for example a habitual or generic property ((230), (231), see also (216) above).

(229) Jeff is a jerk. (ibid: 71)
(230) Tess plays the flute. (ibid: 69)
(231) Sudden stresses shatter concrete.

The present progressive refers to an ongoing process so here the situation is reversed: use of a verb denoting a process is unexceptional (232), but verbs denoting states require special interpretations ((233) refers to some specific, ongoing, action(s) of Jeff's that characterise(s) him as a jerk; (234) refers to a process of change in the extent to which the state of understanding holds).

(232) Tess is playing the flute. (ibid: 69)
(233) Jeff is being a jerk. (ibid: 71)
(234) I am understanding the semantics of aspect better and better every day. (ibid: 71)

Verbs denoting achievements (which do not extend in time, and so cannot be construed by themselves as ongoing) also receive special interpretations in progressive constructions. (235) is interpreted iteratively (it involves several repeated achievements); (236) can be interpreted as slowing time to the point where the instantaneous transition in the state of the concrete does after all have an internal structure; (237) exemplifies Croft's 'run-up achievement' (Croft argues, contrary to Vendler, that examples like this are acceptable, and that the process referred to is one that is leading inevitably to the transition denoted by the verb). (236) might alternatively illustrate the use of the progressive to refer to imminent future events: *It is decided: Shelly is shattering the concrete, you are sweeping up the shards, so here's your broom.* This possibility is discussed below (4.1.2.5).

(235) Shelly is shattering concrete.
(236) Shelly is shattering the concrete.
(237) Help! She's dying! (ibid: 74)

The 'container adverbial' specifies the length of time from beginning to completion of a telic event. It therefore requires the event to be construed as an accomplishment (telic process). As before, this leads to a straightforward interpretation of verbs with matching profiles (238) and calls for special interpretations of verbs with non-matching profiles. (239) shows that the container adverbial can be used with verbs profiling states, referring to the duration of a process culminating in the beginning of the relevant state; (240) shows that it can also be used with verbs profiling processes, referring to the duration of the process culminating in the beginning of the relevant activity; (241) shows that it can also be used with verbs profiling achievements, referring to the run-up period.

(238) I wrote the letter in an hour. (ibid: 75)
(239) In two years, she was president of the company. (ibid: 77)
(240) The horse was galloping in two minutes. (ibid: 77)
(241) She fell ill and died in two weeks. (ibid: 76)

The 'durative adverbial' refers to the duration of an otherwise unbounded state of affairs. It is therefore most natural with verbs denoting states or activities ((242), (243)). However, it is also compatible with verbs denoting telic processes (in (244) it refers to the duration of the state resulting from the accomplishment profiled by the verb) or achievements (in (245) it refers to the duration of a cyclic process consisting of a series of point transitions and in (246) to an iterated series of point transitions).

(242) She was president for two years.
(243) I slept for three hours. (ibid: 75)
(244) Patty put it in the pantry for three hours.
(245) The light flashed for five minutes. (ibid: 76)
(246) He shattered windowpanes for half an hour. (ibid: 76)

SUDDENLY profiles a pointlike transition. This is obviously most appropriate with achievements (247), though it is also compatible with state words ((248) refers to the sudden inception of the relevant state), with activity words ((249) refers to the sudden starting of the relevant activity) and with accomplishment words ((250) refers to an action that takes place punctually and so compresses the time taken between beginning and completion into a single moment).

(247) The window suddenly shattered (ibid: 75)
(248) Suddenly he was in a large cavern. (ibid: 78)
(249) Suddenly the horse galloped. (ibid: 78)
(250) She suddenly shut the door. (ibid: 78)

Finally, Croft uses the adverb ALMOST, the 'prospective' *be about to*, and the 'conative' *try to* to demonstrate that the structure of accomplishments (telic processes) requires two transition points (ibid: 78). These three constructions profile the processes running up to the inceptions of activities (251), achievements (252) and states (253), but are ambiguous with accomplishments, where they profile either the process running up to the inception (the first transition) or that running up to the completion (the second transition) (254).

(251) She almost ran/was about to run/tried to run.

(252) The mouse almost squeaked/was about to squeak/tried to squeak.

(253) She almost was chair/was about to be chair/tried to be chair.

(254) She almost crossed the river/was about to cross the river/tried to cross the river.

In this section, I have presented Vendler's (1967) and Croft's (1998b) aspectual categories. The two are in rough correspondence: both agree that events can be classified into states and non-states and that the latter consist of processes, bounded processes (accomplishments) and point transitions (achievements). They also both demonstrate (Croft with particular force) that, though particular verbs may be associated canonically with particular aspectual classes, all can be coerced into any of the other classes, by other words or constructions. Further, that it is the constructions that are used to identify the various classes that are responsible for this coercion.

It should also be clear that the aspectual classes are in some measure independent of event types of the sort discussed above (3.1.4). The state/non-state distinction is reflected in the event type hierarchy (3.1.4.2), but the classification of the non-states does not fully reflect their aspectual properties: Becoming, Creating and Making between them represent the telic events, some of each being achievements and some accomplishments, and the remainder (some in Happening and some in Affecting) are the non-telic events (processes/activities).

The partial correspondence between the two classifications follows from the nature of the classifying properties: the event types in the event type hierarchy are defined by the number and nature of the semantic roles they support and some of the properties of the various semantic roles are relevant to aspectual class (for example whether the affected argument undergoes a permanent change of state), whereas others are not (for example whether the affected argument is the same as the actor). Similarly, some of the defining properties of the aspectual classes are relevant in the selection and linking of argument roles (for example whether the event is telic - whether it has a result), whereas others are not (for example whether a telic event extends in time - whether the time of the causing event and that of the resulting event are different).

The distinction between the temporal and causal properties of event structures is also made by Croft:

> "[T]he basic structure of events is causal: Event structure is part of the causal network that unfolds over time" (ibid: 79).

While the temporal structure of events interacts with their causal structure (and determines properties and interpretations of sentences as noted above), it is only the causal structure that determines the number and nature of the semantic roles associated with the event.

This leads to an analysis where the aspectual classes identified above are generalisations over different aspectual structure configurations. WG representations of the relevant generalisations are given in the following section, where I also explore the mechanism that governs the interaction of the aspectual class of the verb and that of the construction.

4.1.2 Aspect in WG: event classes; states and processes; telic and non-telic processes; point transitions; iteration

In this section I present a WG analysis of the various aspectual classes identified above, expressed in terms of differences in semantic structure (both lexical and compositional). These differences in semantic structure explain the interactions with the various constructions discussed above. As in Jackendoff's (1992) analysis (which is briefly presented here too for comparison), the semantic structures that define the aspectual classes are used also in the analysis of semantic number and other properties of the referents of nouns.

Unlike that analysis, this one does not express the differences in terms of binary features, rather in terms of network structures of the sort already discussed at length. This makes the WG analysis both more explanatory (the semantic structures explain the interactions between words and constructions) and more flexible (different words' senses have different sets of the properties that identify the aspectual classes: for example, Flashing and Dying are both classified as achievements, yet *It flashed all day* receives an iterated interpretation where *She died all day* does not). This is an important property of the WG analysis (and one which surfaces throughout the thesis). In the current section it means, among other things, that the separation of events into

four distinct aspectual classes is not possible (for presentational purposes, and because they do represent significant generalisations, I keep the terms for the aspectual classes).

I begin with a classification of entities in WG.

4.1.2.1 Classes of entity; classes of event

Jackendoff (1992), working in the framework of Conceptual Semantics (Jackendoff 1976, 1983, 1987, 1990), develops a feature-based account of noun phrase semantics. "Using the strong formal parallelism between noun phrase semantics and event structure that is a hallmark of the Conceptual Semantics approach" (1992: 9), an idea which he also traces to Bach (1986), Gruber (1976), Langacker (1987) and Talmy (1978) among others, he applies this account to an analysis of aspect and event structure.

Jackendoff identifies four classes of concept defined by the two "fundamental conceptual features" (1992: 18) +/-b (**bounded**) and +/-i (**internal structure**). These features apply to both objects ("Material Entit[ies]") and events ("event/process" 1992: 20). The table shows the four classes; the descriptions of the objects and events in each class, and the examples provided, are from Jackendoff (ibid: 20).

	+b	-b
-i	individuals (*a pig*) closed events (*John ran to the store*)	substances (*water*) unbounded homogeneous processes (*John slept*)
+i	groups (*a committee*) bounded iterative events (*The light flashed until dawn*)	aggregates (*buses, cattle*) unbounded iterative processes (*The light flashed continually*)

Table 3. Four classes of objects and events.

Bounded elements are differentiated from unbounded ones by consideration of their parts: unbounded elements can be divided up into parts (or portions), which still count as a token of the same element (water can be divided into portions which can be described as water), whereas bounded elements cannot (the parts of a pig cannot be described either as a pig or as pigs). The feature **b** distinguishes plurals and mass

nouns on the one hand from singular count nouns on the other (a set of buses can be divided up into parts also describable as sets of buses, though not without limit). Unbounded elements can have distributive locations (255); the property carries over into events with unbounded arguments (256) (ibid: 19).

(255) a. There was water all over the floor.

b. There were books all over the floor.

c. *There was a book all over the floor.

(256) a. Bill ate custard until dawn.

b. Bill ate hotdogs until dawn.

c. *Bill ate a hotdog until dawn.

The feature **i** distinguishes mass nouns from plurals. Elements with internal structure (whether bounded or unbounded) consist of sets of more or less homogeneous members.

The WG analysis presented here makes the distinction between differentiated elements (things) and undifferentiated substance (stuff) basic: it appears at the top of the isa hierarchy. This distinction closely matches that made by Jackendoff's boundedness feature, except that, as I show, aggregates are counted under things; it also matches the distinction made by Jackendoff's +/-i, except that individuals are counted as +i (they have parts). The relevant structure is shown in Figure 67.

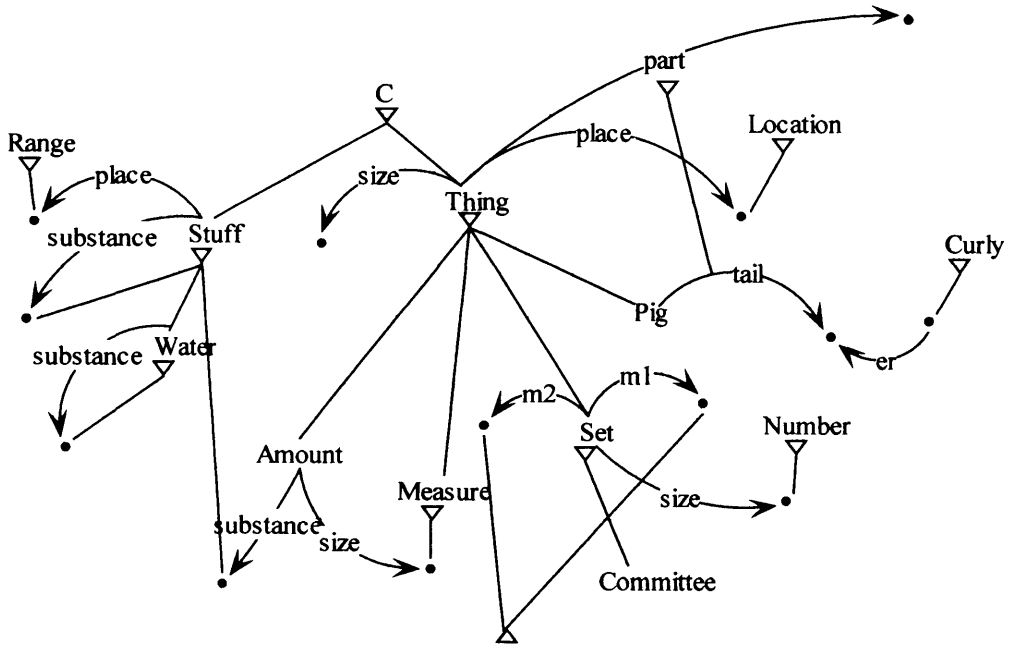

Figure 67 Stuff and Things.[27]

- Stuff is identified by the fact that it occupies a range of space (its place isa Range; Range itself will prove to be a kind of set (an **aggregate**, see below), though this is not shown here).
- Stuff has a substance (which will prove to be a kind of part); the substance is itself stuff, and in the subclasses (Water is shown) the substance is a token of the parent (it has all the same properties).
- A thing occupies a single location (Location itself isa Thing), rather than a range, and has a size (it is bounded).
- Things have parts (contrary to Jackendoff's claims, I argue that individuals do have parts; for example pigs have tails, trotters etc). The parts of a thing are, by definition different (and different in kind) from the thing they are the parts of (a pig's tail is a tail, not a pig).
- Sets are a special kind of thing, in that the parts are members. The members (there are always at least 2) are homogeneous. This is shown in the diagram by the fact that both members inherit from the same category. Notice that this homogeneity is a matter of degree/construal:

[27] Ii is not immediately clear that Stuff and Thing need to have a common parent. They do have some properties in common (both have a place for example), and for this reason a common parent C is shown.

the parts of a pig for example share a common ancestor (body part), though they are not construed as a set (except for example in the referent of the phrase *parts of a pig*).

- A set may have a place, which is a range. The parts of the place (which are locations) are the same as the places of the members. Since the parts of a range are locations (and therefore Things), and since they are **all** locations (and therefore form a homogeneous group), it follows that they are members (Range must isa Set) (Figure 68).

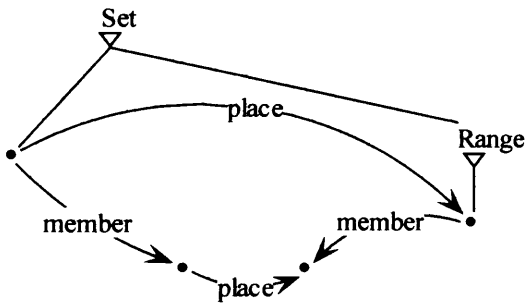

Figure 68 The place of a set is a range.

- The size of a set is a number (the number of the members).
- Mass nouns clearly refer to stuff, and singular count nouns to things. Some count nouns (eg COMMITTEE) refer to sets, as do plural nouns (*three little pigs* refers to a set of pigs, each of which is little (see Figure 69)).

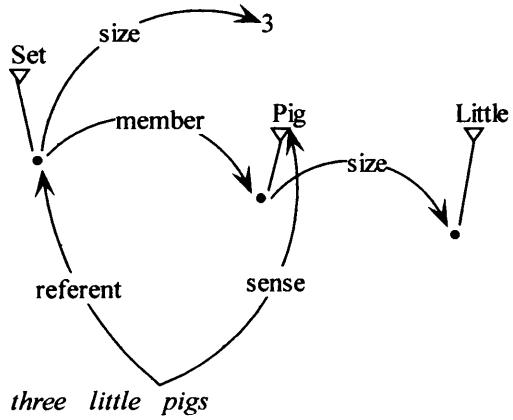

Figure 69 *three little pigs*

- Other (count) nouns refer to Amounts (eg *a pound of butter*). An amount has a unit size, and its place is a location. Exceptionally, it has a substance (a substance is a part which isa Stuff).

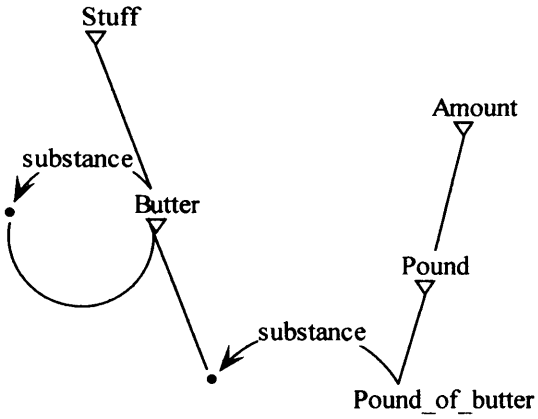

Figure 70 Butter; pound of butter

- An amount can also have as its substance the referent of a plural count noun (eg *a pound of peas*). In this case, the substance is an Aggregate, which is a set construed as some stuff. This is only possible when the members are sufficiently homogeneous (similar to each other). Arguably, things like rice are always aggregates, rather than stuff, because they consist of a number of individuals, though this property is not foregrounded.
- Because the elements of which an aggregate is composed are (construed as being) so small and so homogeneous, it is as if it has no part which is not a token of the same aggregate (see Figure 71).
- The places of sets (which are themselves sets) can also be construed as aggregates, to the extent that the places of their members approximate to each other. The places of aggregates are necessarily construed as aggregates.

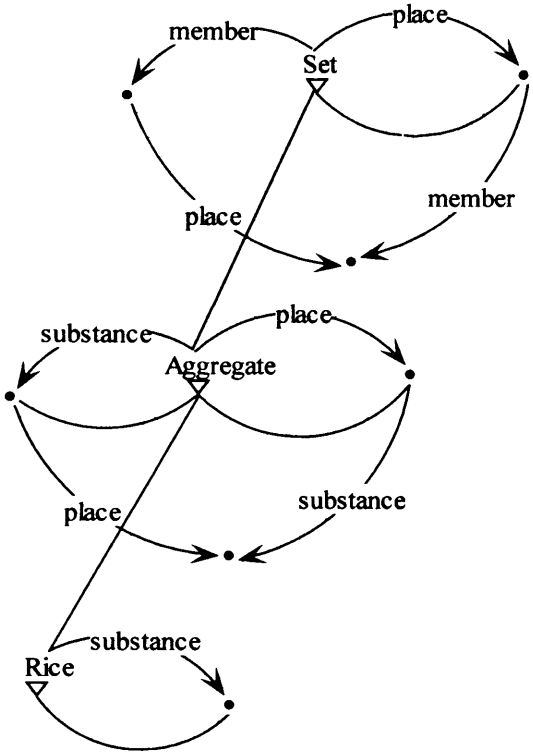

Figure 71 Set and Aggregate.

- The examples given above are of entities. The claim is, however, that the same system of classification also applies to events (**predicates**). This means that the hierarchy given in Figure 67 must be merged with the event type hierarchy given in 3.1.4.2. This is achieved using multiple inheritance, as shown in Figure 72.

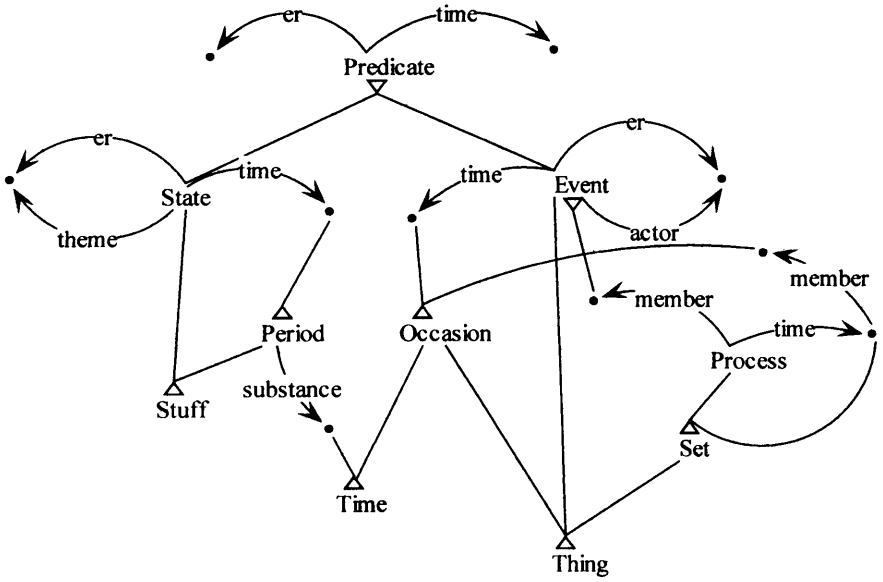

Figure 72 States and Events.

- Predicates have ers and times. Some (the states) isa Stuff and some (the events) isa Thing (are things). States (represented by Being) and Events have the thematic properties discussed above (3.1.4.3): the er of a state is its theme; the er of an event is its actor.
- The time of an event is an occasion (a point in time); the time of a state is a period (which also isa Stuff). Notice that this pattern matches that of the places of Stuff and Thing (Figure 67): the temporal properties of states and events are parallel to their spatial properties.
- Just as there are sets of entities, there are also sets of events. These have times, which are periods whose members are the times of the members of the set, unless they are sufficiently similar to count as the substance of an aggregate. Again, this is the same pattern as was given above for the places of sets. A set of similar events with different times corresponds to Vendler's category of processes:

  > "[R]unning, writing and the like are processes going on in time, that is, roughly, [that] they consist of successive phases following one another in time." (1967: 99).

  Walking consists of a set of successive steps (acts of stepping), writing of a set of successive acts of writing a single character etc.
- Vendler contrasts these processes with states, which are not sets but rather single states of affairs that persist through time:

  > "[A]lthough it can be true of a subject that he knows something at a given moment or for a certain period, knowing and its kin are not processes going on in time." (ibid: 99-100)

4.1.2.2 Canonical uses of 'simple' and 'continuous' present

Verbs profiling states and processes are canonically associated with different tenses in the present: states with the 'simple' and processes with the 'continuous' present. This is illustrated in (215) and (216) above, and in (257) and (258). Under the present account, this must follow from the interaction of the lexical semantic structures of the verbs (specifically, their aspectual properties) with those of the two 'tenses'.

(257) Ashley understands aspect.

(258) Wally is walking.

A present tense verb refers to a lasting state of affairs true at the time of speaking (a state whose time is a period including the time of the utterance);[28] a present progressive refers to a process (ie a set) ongoing at the time of the utterance. These properties are represented in the structures given in Figure 73 and Figure 75.

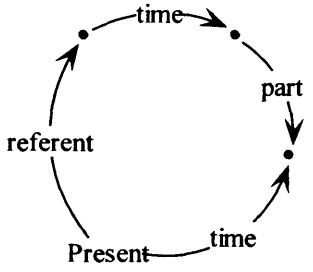

Figure 73 The present tense.

➢ Present is a lexical category. Present tense verbs inherit the properties given in Figure 73 from the inflectional category alongside the properties of their lexeme, by multiple inheritance (see 1.2.2). A partial structure of (257) is given in Figure 74.

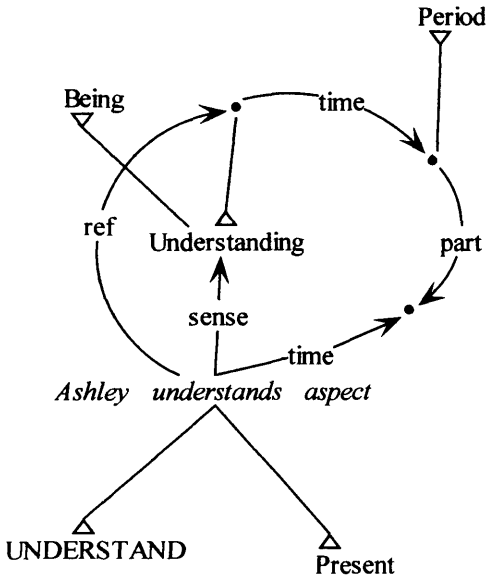

Figure 74 *Ashley understands aspect.*

➢ The sense of *understands*, which is derived from the lexeme UNDERSTAND, is a state. The referent of *understands* (the meaning of the utterance) is a token of the

[28] Croft notes that the simple present may also be used in the case of 'point states' as in *It is midnight* (1998b: 70). Here the time of the referent is exactly the same as that of the utterance.

sense, and so also a state; its time is a period, part of which is the same as the time of the utterance.

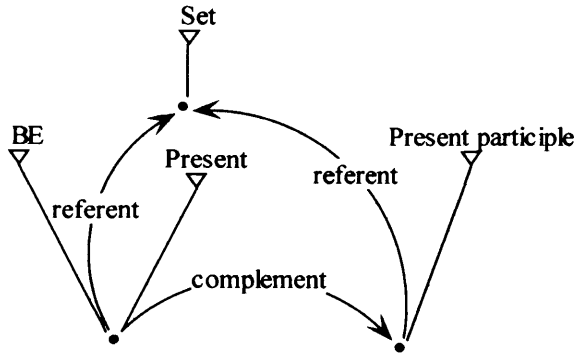

Figure 75 The present progressive.

- Present participle is another lexical category and again verbs can inherit properties from it alongside their own lexical properties. In the present progressive, PresPart is used as the complement of present tense BE, the properties of the construct deriving from those of the participle and those of its parent. Present tense BE contributes the temporal properties of the present tense (Figure 73) and takes its referent from its complement (as is common for BE); the complement contributes its own semantics, which include the specification that the referent is a set. This is specific to the construction, and overrides the normal referent of BE (which isa Being). A partial structure of (258) is given in Figure 76.

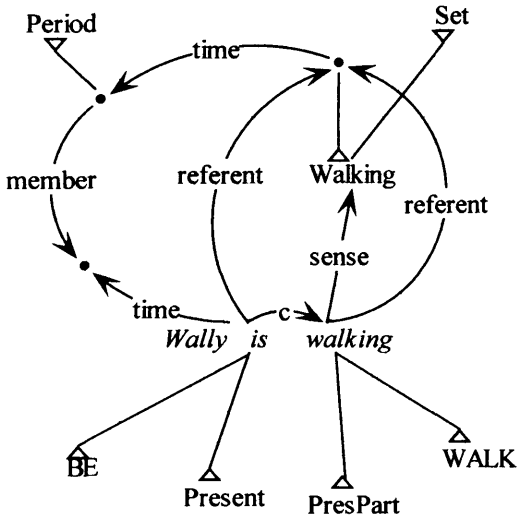

Figure 76 *Wally is walking.*

- The sense of *walking*, derived from the lexeme WALK, is a set. The referent, which is also the referent of *is* (and so the meaning of the utterance), also is a set and again its time is a period, part of which is the same as the time of the utterance.

4.1.2.3 Non-canonical uses of 'simple' and 'continuous' present

As noted above, Croft (1998b) points out that, in appropriate contexts or with appropriate interpretations, many verbs (and adjectives) can be used in non-canonical constructs. So a verb whose sense is a state can be used in a progressive construction (259) and a verb whose sense is a process can be used in a 'simple' present construction (260).

(259) Ashley is understanding aspect more and more each day.
(260) Wally walks.

Far from undermining the analyses for the aspectual classes and the constructions given above, these examples actually support it, because the interpretations under which they are possible depend on the meaning of the verb being coerced to conform to that of the construction. Partial structures of (259) and (260) are given in Figure 77 and Figure 78.

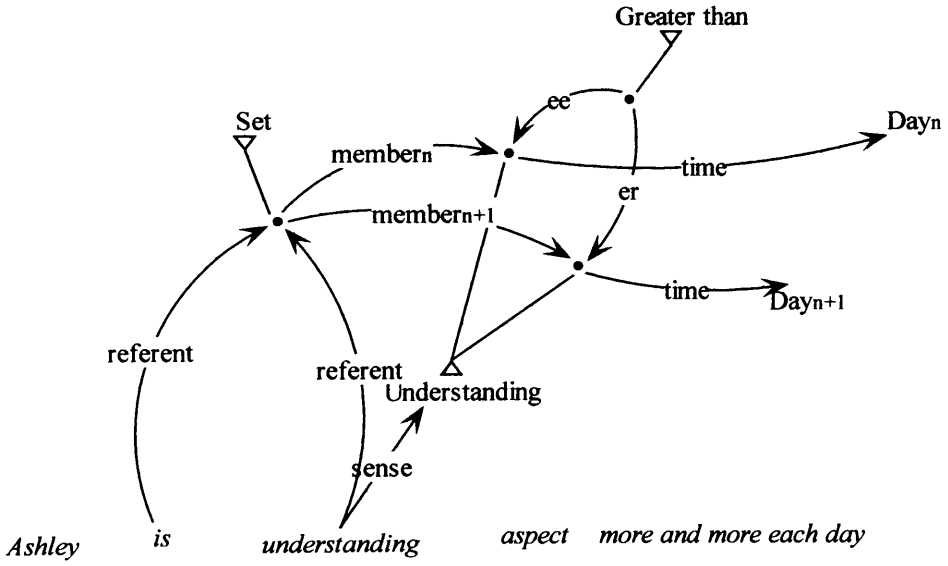

Figure 77 *Ashley is understanding aspect more and more each day.*

- Since the lexical structure of the progressive requires that its referent be a process (a set), a process is made out of the sense of the verb in order to make the construct coherent. In this case, this takes the form of a set of states of understanding, taking place on successive days and with progressively greater magnitudes.
- The referent of *is* (and therefore also the referent of *understanding*) is a set. Its members are tokens of Understanding, the sense of *understanding*. Two members are shown, the nth and the n+1th, and their times (on consecutive days) and sizes (that of the latter greater than that of the former) are given. The construct is otherwise exactly similar to that shown in Figure 76.
- Notice that the members of the set are ordered. The relevant meaning cannot be expressed without referring to the respective order of the states of understanding (this is the only property that distinguishes this structure from that of *Ashley is understanding aspect* ***less and less*** *each day*). The members of a set share some common property or properties, but necessarily differ from each other in other properties. When they differ as to time or place, they can of course be ordered with respect to this property.

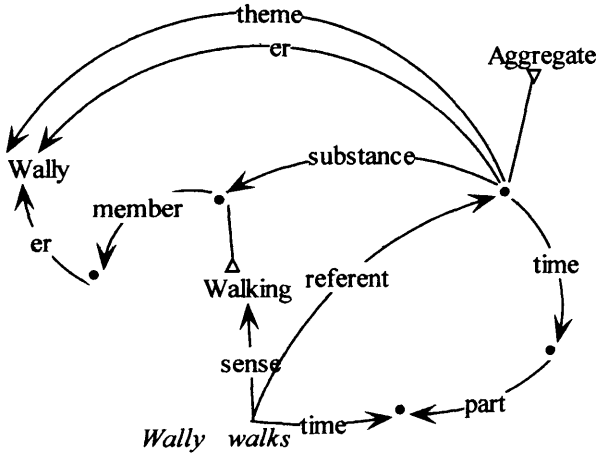

Figure 78 *Wally walks.*

- *Wally walks* refers to a set of different walks undertaken regularly by Wally. The sense of the verb provides the model for the members of the set (the sense is itself a set, a subsense identifies a set whose members all have Wally as their er (a single walk of Wally's), and this acts in turn as the model for the membership of the referent).

- Because the taking of regular walks is construed as a stable property of Wally's, the particular set functioning as the referent is an aggregate: the interpretation abstracts away from its membership and foregrounds instead its global properties. Aggregates are exceptional, as sets, in that their members are reanalysed as substance, and in that they support associations other than member and size: they have the properties of non-sets. Because of this they behave very much like substances. The referent of *walks* in the example has Wally as its er and theme, as a state would.
- As an aggregate, the referent has a period as its time, part of which is the same as the time of utterance.

4.1.2.4 Two kinds of process

Having explored the difference between states and processes, Vendler goes on to distinguish two kinds of process: telic and non-telic. Telic processes are directed towards (and end in) a specific goal, whereas non-telic processes are not:

> "Running a mile and drawing a circle have to be finished, while it does not make sense to talk of finishing running or pushing a cart." (Vendler 1967: 100).

Non-telic processes consist of sets (or aggregates) of relatively undifferentiated members: the members of a set are all of a kind, which is to say they instantiate a relatively specific event. The members of a process, which is a set of individual events with different times, are ordered as to time. The telic processes demonstrate that some processes are defined by the final member of the set. Figure 79 shows the structure of *Ronnie ran*, which refers to a non-telic process; Figure 80 shows the structure of *Ronnie ran a mile*, which refers to a telic process.

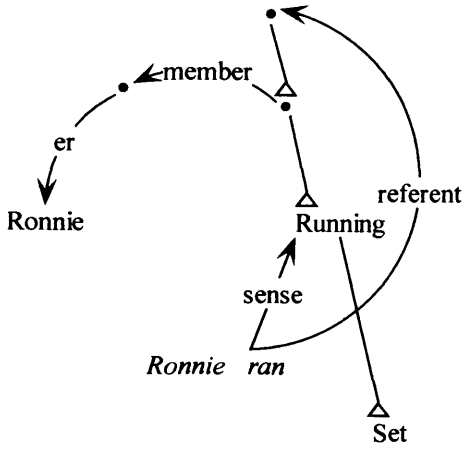

Figure 79 *Ronnie ran.*

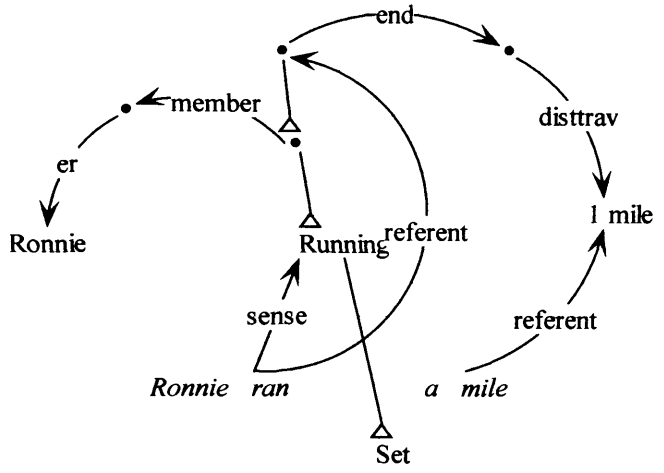

Figure 80 *Ronnie ran a mile.*

- The sense of *ran* in Figure 79 is Running, a set. The referent instantiates this set (by way of an intermediate set all of whose members have Ronnie as their er).
- The sense of *ran* in Figure 80 is also Running. The referent instantiates this set (by way of an intermediate set all of whose members have Ronnie as their er). The end (final member) of the referent is identified by the distance travelled (one mile).[29]

The presence of the end relationship in the structure of telic processes accounts for the fact that progressive constructions referring to telic processes do not entail

[29] The relationship labelled -disttrav> ('distance travelled') is a simplification. Very likely a properly developed analysis would be somewhat more complicated. However, it will certainly have to refer to the end of the process.

corresponding perfective constructions (see (223) and (224) above). Because of the nature of a set, the parts of a process themselves count as events of the same kind:

> "running and its kind go on in time in a homogeneous way; any part of the process is of the same nature as the whole." (Vendler 1967: 101)

But since telic processes have a defined end, the parts preceding the end are not themselves telic (and they are therefore a different kind of event).

(261)a entails (261)b because the structure of the former contains that of the latter (see Figure 81, Figure 82). (262)a, by contrast does not entail (262)b because the structure of the former does not contain that of the latter (see Figure 83, Figure 84).

(261) a. Ronnie is running.

b. Ronnie has run.

(262) a. Ronnie is running a mile.

b. Ronnie has run a mile.

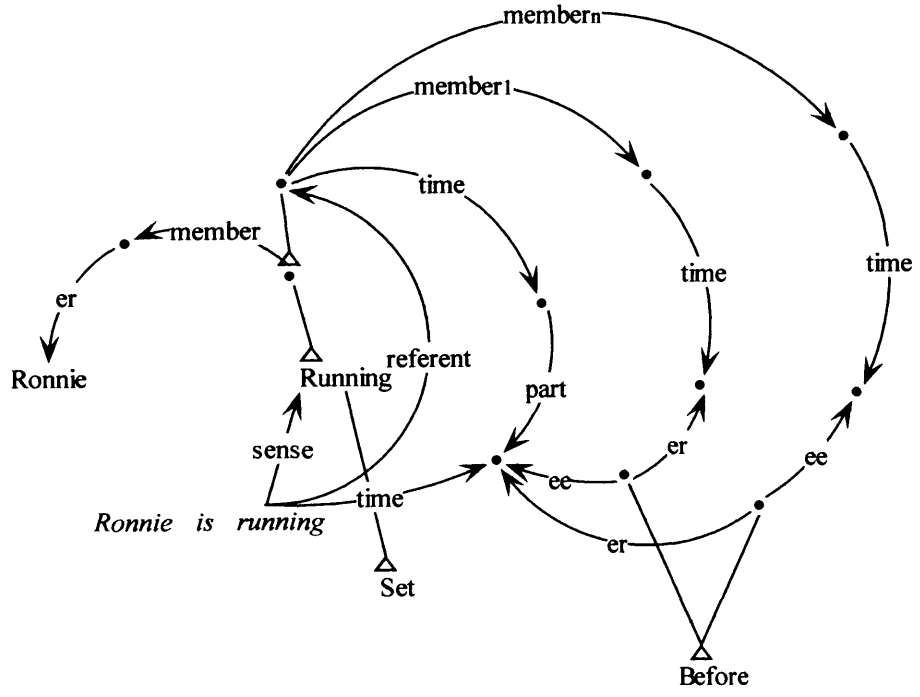

Figure 81 *Ronnie is running.*

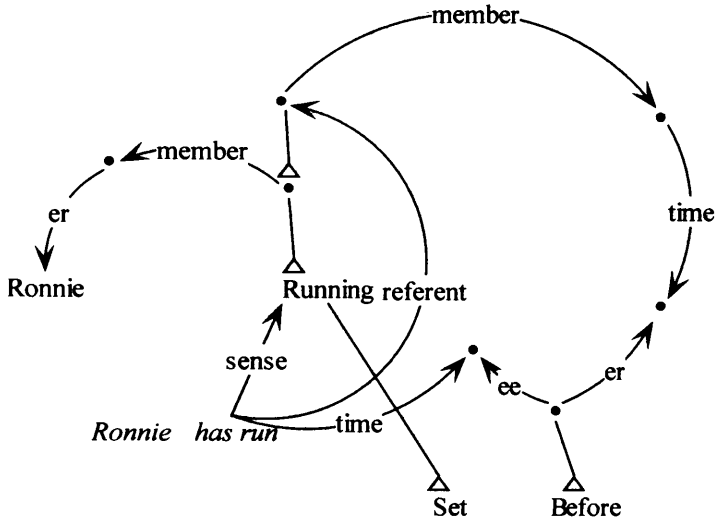

Figure 82 *Ronnie has run.*

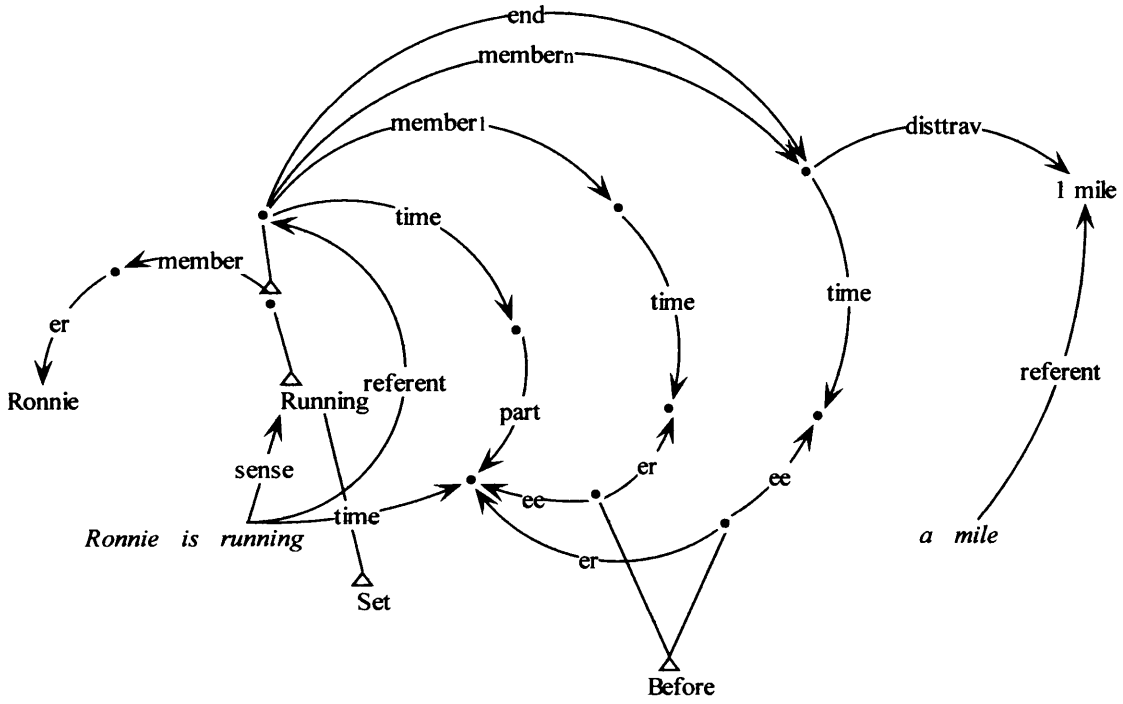

Figure 83 *Ronnie is running a mile.*

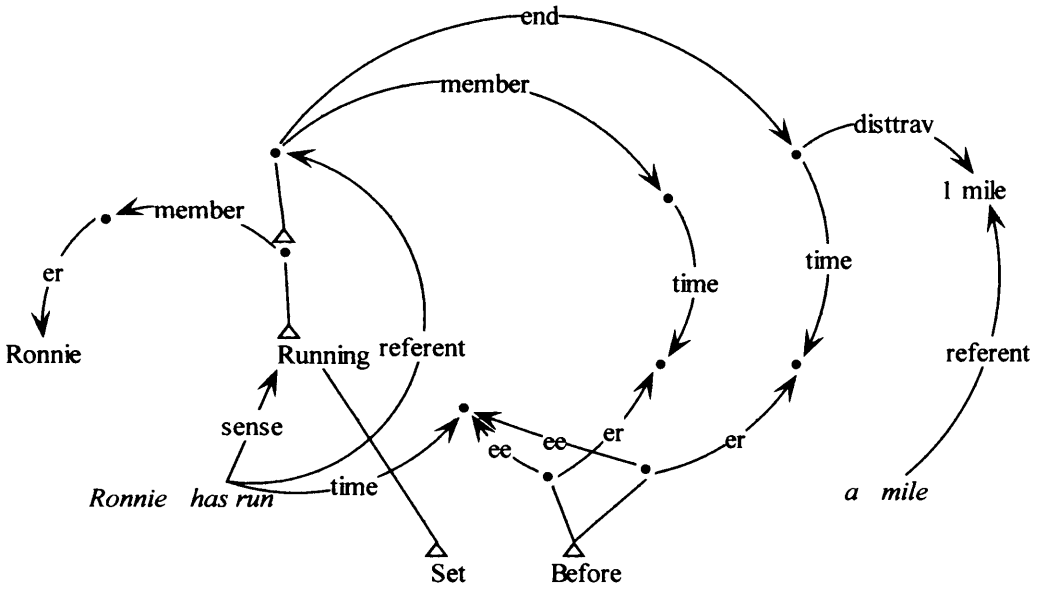

Figure 84 *Ronnie has run a mile.*

- The progressive construction refers to a set one of whose members (not the first or last) coincides with the time of utterance. The perfective construction refers (in these examples) to a set whose final member precedes the time of utterance.
- The structure of the progressive construction with the non-telic referent contains a structure where a set of suitable events precedes the time of utterance. That with the telic referent does not, since the progressive is not compatible with a structure where the final member of the set precedes the utterance. Of course, (262)a does entail (261)b, since that structure is contained in the progressive construction.

The prepositions FOR and IN, in their temporal uses, also distinguish between bounded and unbounded processes:

(263) Ronnie ran for/*in 5 minutes.
(264) Ronnie ran a mile *for/in five minutes.

Both prepositions can specify the time of a process. FOR profiles a relationship between a state or process and its time (which is a period), IN profiles a relationship between the time of a telic process and another period. Figure 85 gives partial structures for both.

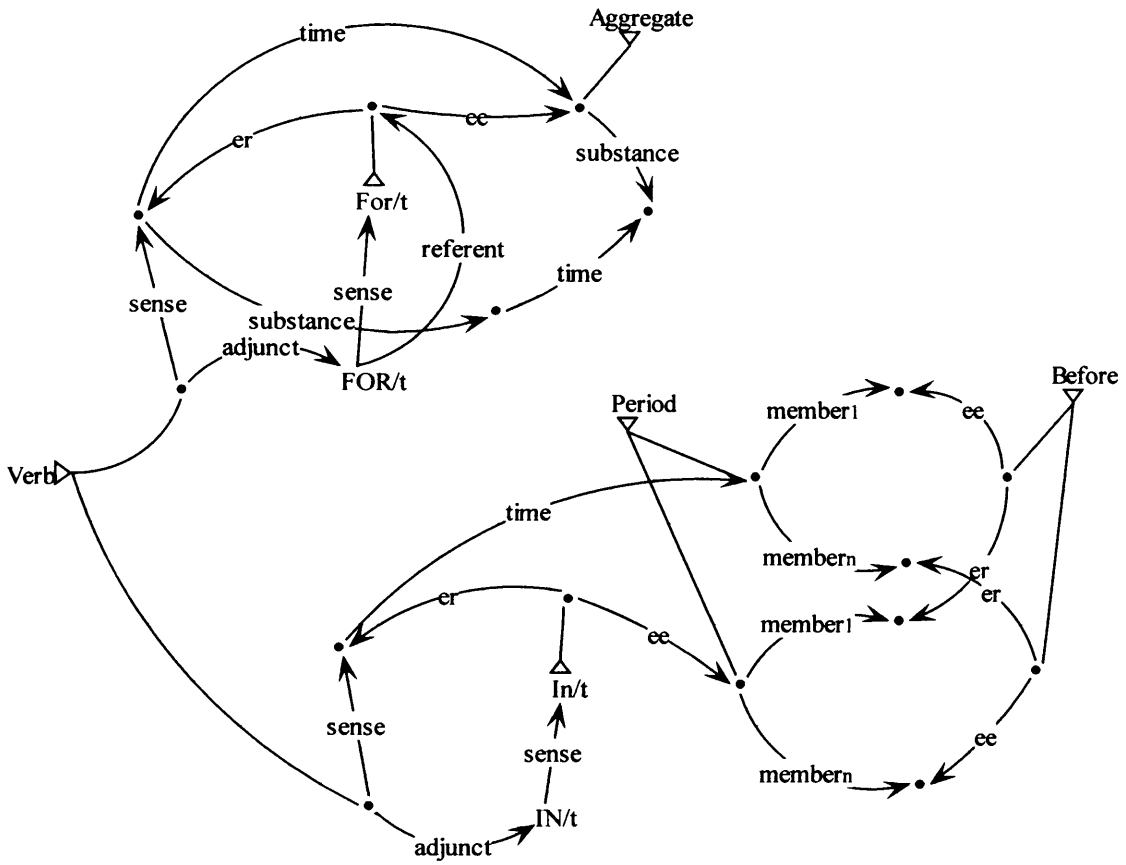

Figure 85 FOR and IN.

- For/t (the *t* is for 'temporal') has an er and an ee; the ee is the time of the er. It is not immediately clear how this is related to other uses of FOR (of course, it need not be related at all). The ee is an aggregate, and has a substance, which is the time of the substance of the er (the event must therefore also be construed as an aggregate).
- In/t has an er and an ee; the first member of the ee (which is a period, so its members are point times) precedes the time of the beginning (first member) of the er (which is a process, so its members are events) and the last member follows the time of the end of the er. This structure represents the containment of the process by the time period, and it corresponds exactly to spatial containment (in one dimension) so it is clearly related to the structure of spatial In.
- Clearly the structure given for In/t is only compatible with telic processes: the er must have a beginning and an end, with separate (point) times. The structure of

For excludes its use with telic processes, since these cannot be construed as aggregates.

A telic process like running a mile can be converted into a non-telic one by being made into a habit (*Ronnie runs a mile each day*; see Figure 78 above). This can itself have a duration, so that under this habitual interpretation FOR and other expressions profiling durations are possible:

(265) Ronnie ran a mile each day for a month.

4.1.2.5 Accomplishments and achievements

The telic processes above are the accomplishments. In some accomplishments the end is also a result. Running a mile is not effective or affective, but drawing a circle (for instance) is effective: it produces a circle. That the result is a different kind of relationship from part or member can be seen by comparing the accomplishments, which have members and results, with the fourth and final of Vendler's classes, the achievements, which are not sets (and so do not have members) but do also have results.

Achievements, unlike accomplishments, occur "at a single moment" (Vendler 1967: 103). It is for this reason that words referring to achievements appear most naturally with the preposition AT, which profiles a point in time:

(266) The glass shattered at 3.03/?in 3 hours/*for 3 hours.

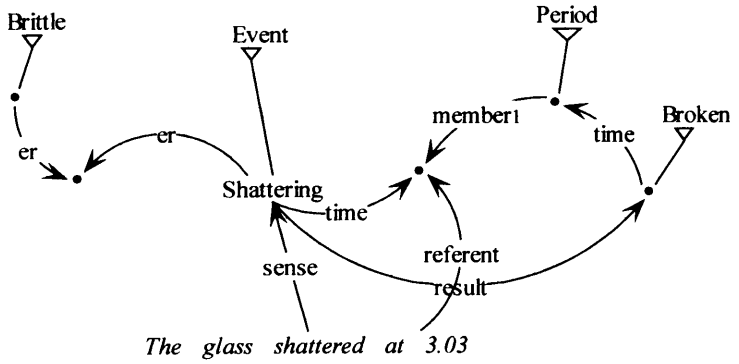

Figure 86 *The glass shattered at 3.03.*

- Shattering is an Event and has an er, which is an actor. The er must be brittle to be able to shatter (this is also part of the definition of brittleness).
- The time is a point, the referent of 3.03.
- Shattering has a result, here given as a case of Broken, which is a state so its time is a period. The time of the result starts at the moment of shattering. It is because of the presence of this state that some verbs referring to achievements can appear with temporal FOR (*Wendy woke for 3 hours*); in these cases the preposition refers to the duration (=time) of the result.

Because they have point times, achievements are not readily compatible with the present simple and progressive constructions, both of which have a time which is part of an ongoing period ((267), (268)). Words referring to achievements are more natural with the present perfect: (269) can refer to a shattering that takes place at (or immediately before) the moment of utterance.

(267) *The glass shatters.
(268) *The glass is shattering.
(269) The glass has shattered.

Of course, and as noted above (4.1.1), verbs usually referring to achievements can be used with simple and progressive constructions, if the meaning of the construction is adapted to conform to that of the verb (270) or vice versa (271).

(270) a. I'm in the pub last night, right, and this geezer comes up and shatters my glass. I goes, "Oi!" ...
b. She's leaving town tomorrow.
c. The prisoners die at dawn.
(271) a. Glass oven dishes shatter if you use them on the hob.
b. See, now the brick is shattering the window.
c. Come quick, Shelly's shattering all the glasses!

- (270)a exemplifies the 'historical present', where the present tense adds immediacy to a narrative of events that took place in the past. This is possible whatever the aspectual class of the verb's referent.
- (270)b and c both refer to future events. Again the use of the present tense adds immediacy. Perhaps the times of the referents are periods including the time of utterance and the time of the event (they both mean that the event is bound to happen, as determined at the time of utterance (b) or before it (c)).
- (271)a is interpreted habitually or generically. The structure is similar to that shown in Figure 78 above for *Wally walks*.
- (271)b construes the event as if it were happening in slow motion (it might be appropriate in a context where the shattering of the window is being viewed on a video playback). By extending the moment at which the brick passes through the window, shattering it, it forces the event to be interpreted as an accomplishment.
- (271)c refers to a series of repeated achievements (a set), as in (235) above. This possibility is noted by Croft (1998b: 74). The structure is as given in Figure 87. The referent is a set of shattering events, each having the same er, and so is a process, which may or may not be telic (*She shattered glasses all afternoon*, *She shattered all the glasses in 12 minutes flat*).

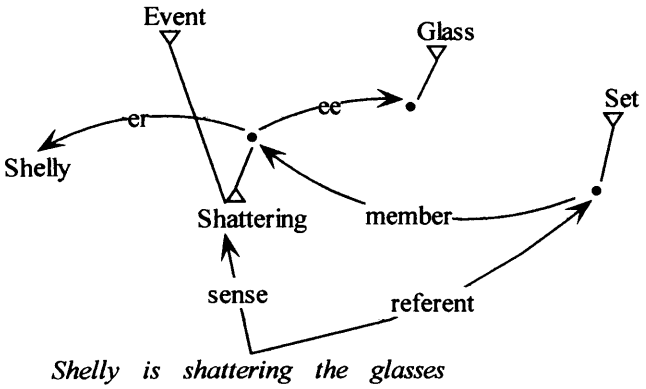

Figure 87 Shelly is shattering the glasses.

SHATTER does not appear to support Croft's 'run-up achievement' (ibid: 74, see also (237) above). If we place a piece of glass in a vise and steadily increase the pressure until it shatters, we cannot say during the process that we are shattering the glass. As noted above (4.1.1), Vendler makes similar claims about REACH:

"Even if one says that it took him three hours to reach the summit, one does not mean that the 'reaching' of the summit went on during those hours. Obviously it took three hours of climbing to reach the top." (1967: 104)

DIE, however, does support run-up achievements, as shown in Croft's original example (*Help! She's dying!*) (ibid: 74). The structure of this example must be rather like that of (270)b: the time of utterance is a member of a set (or aggregate) of times starting with some (former) event (or state) that causes her death and ending with the (later) death itself. A structure is given in Figure 88.

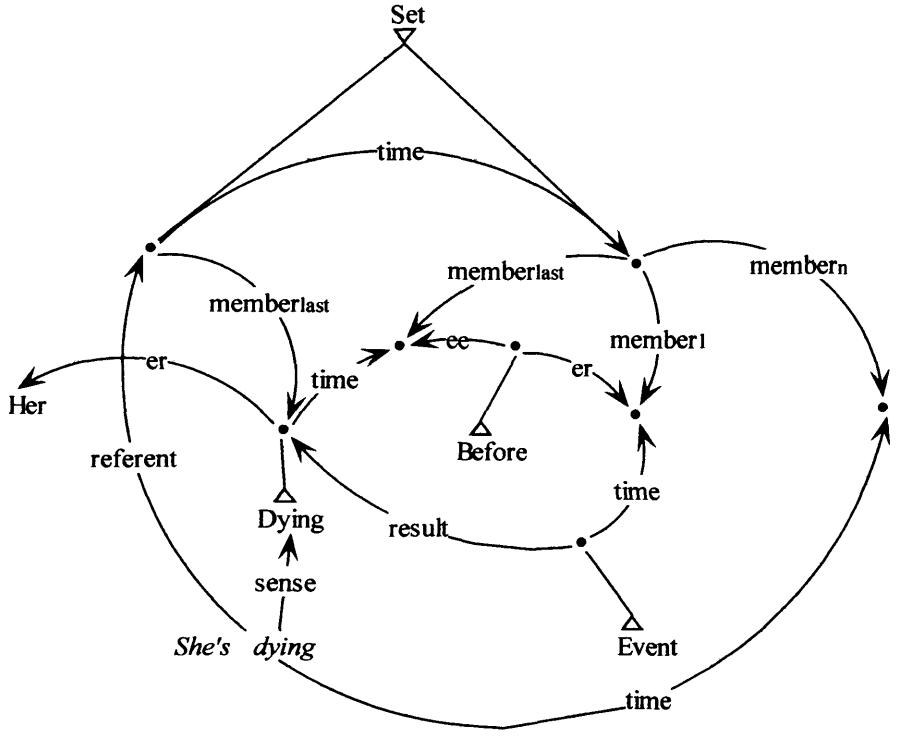

Figure 88 *She's dying.*

Notice that this structure requires the presence of some causing event. Croft notes that the example is not appropriate in the absence of such an event (something must already have happened to bring about the imminent death of the actor):

"I cannot say I am dying at this very moment just because I am mortal; I have to be terminally ill or mortally wounded" (ibid: 74)

The referent in Figure 88 is an accomplishment, and indeed the 'run-up' interpretation of progressive constructions is the usual one for verbs profiling accomplishments (see (262)). The construction refers to a process leading up to the

profiled end point. This is equally true in past progressives, which refer to a past moment in the midst of such a process. Note, however, that the end point need not actually be reached (272).

(272) a. Ronnie was running a mile (when he dropped down dead).
b. I was writing a letter (when my pen ran out).
c. She was dying when they found her (but they saved her).

Achievements are not compatible with temporal FOR (even when construed as telic processes) (273). When a 'run-up' interpretation is available, temporal IN is permitted (274); here the causing event (the stabbing) counts as the beginning and the death as the end of the process profiled by the structure of the preposition (see Figure 85).

(273) *The victim was stabbed in the neck and died for 3 hours (before paramedics staunched the bleeding).
(274) The victim was stabbed in the neck and died in 3 hours.

4.1.2.6 Iteration

Shattering and dying are both transitions: they profile a change between two contrasting states, one of which is the result of the event. Some achievements, however, consist of more than one such transition. For example, when a light flashes it first goes on, and then goes off again very shortly afterwards ((275)a, b demonstrate that flashing is usually an achievement).

(275) a. The light flashed at 12 seconds after noon.
b. *The light flashed in 12 seconds.

A partial lexical structure for Flashing is given in Figure 89.

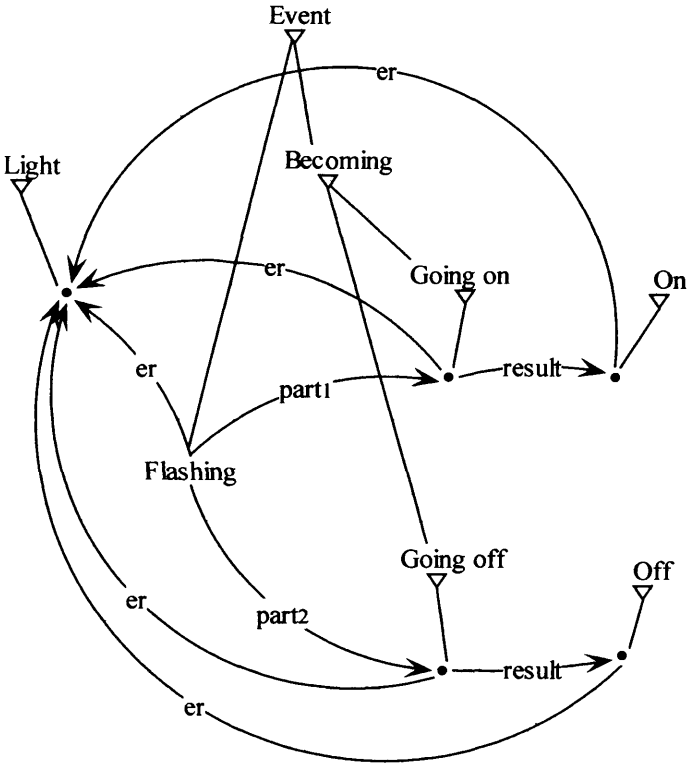

Figure 89 Flashing.

- Flashing is an individual with two parts. The first is a transition from off to on, the second a transition from on to off.
- The er of the flashing is also the er of the two transitions, and therefore also of their results (which are states); this argument is also the er of a preceding state (not shown) of being off (this is really part of the structure of the transition Going on).

It is possible to use the verb FLASH to refer to just part of this structure, as in (276). Here the context makes it clear that the flashing off (and the later flashing back on) consist of just one transition. They count as flashing presumably because of the speed of the transition, and because they appear as part of a series of flashes (the lights have been flashing rather a lot, so any change in their state can be construed as a flash).

(276) At one point all of them flashed off except for 3 of them. That formed a triangle then the light intensity shot up very brightly, then dimmed back to normal, then the other orbs flashed back on.
(http://www.mysticaluniverse.com/ufonews2/ufonews3/ufonews3.html).

Furthermore, it is even possible to reverse the two transitions, as in (277), where the light first goes off and then back on.

(277) My dresser rocked back and forth, the walls creaked, a stuffed hanging parrot swung back and forth, pictures rattled on the wall, the light flashed off once, and I swayed back and forth. (http://www.lanphier.net/bernard.htm)

Assuredly these two examples are exceptional, and possibly ad hoc; examples like these are certainly rare but the fact that they can be found at all is significant.

Flashing can also be transformed into a 'run-up' achievement as in (278), which contrasts with (275)b above. Since flashing is also iterable (as defined below), it can also be transformed into a process as in (279) and (280).

(278) We fired up the generator and the light flashed in 39 seconds.
(279) The light is flashing.
(280) The light flashed all afternoon.

(279) and (280) refer to a process made up of a series of repeated flashes. This is possible because of the nature of flashing: the final state is the same as the initial state, so the event can be freely iterated. Notice that this is not possible with dying:

(281) Di died all afternoon.

Talmy recognises three kinds of transition: **one-way nonresettable**, **one-way resettable** and **full cycle** (2003: 68).[30] Dying clearly exemplifies the first, and flashing the last; resettable transitions include falling and rising for example. One-way resettable transitions can be used with expressions profiling a duration, in which case this is interpreted as the duration of the resulting state ((282) refers to a fall in the stock

[30] Talmy recognises a further three aspectual types: **multiplex** (which consist of sets of full cycle events, like my processes), **steady-state** (for the states) and **gradient** (for gradable changes like widening) (ibid: 68).

price, followed 6 hours later by a corresponding rise); of course this is not possible with non-resettable transitions (like dying) since the resulting state is permanent. Only cyclic transitions receive the iterative interpretation in (280).

(282) The company's stock fell for 6 hours.

As noted by Jackendoff (1992, see above), nonresettable transitions are interpreted as iterated when their affected arguments are indefinite sets (283), as are telic processes (284). Similarly, when the affected argument is a mass, the interpretation is of a process ((285), (286)).

(283) a. Soldiers died all afternoon
b. She shattered glasses all afternoon.
(284) a. Athletes ran miles all afternoon.
b. Drew drew circles all afternoon.
(285) a. Water appeared at the join all afternoon.
b. She shattered glass all afternoon.
(286) Barry baked bread all afternoon.

Notice that it is just the object argument (or subject argument of unaccusatives) that affects the interpretation in this way. The case of verbs with alternating object arguments makes this fact very clear:

(287) Laurie loaded (*the) lorries with (the) lollies all afternoon.
(288) Laurie loaded (*the) lollies onto (the) lorries all afternoon.

In (287), if the set of lorries is interpreted as unbounded then the loading can be construed as an unbounded process, whereas if the number of lorries is bounded (for example, by there being a known set (of known size) of lorries in the context), the loading is interpreted as a bounded process. In (288) it is the boundedness of the set of lollies that affects the boundedness of the process. This property of objects is captured by Dowty's **incremental theme** (1991).

This same contrast affects the appropriacy of temporal IN in the construct:

(289) Laurie loaded *(the) lorries with (the) lollies in 2 hours.
(290) Laurie loaded *(the) lollies onto (the) lorries in 2 hours.

(289) and (290) must be interpreted as referring to bounded processes, if the preposition is to be included. This is only possible if the process is bounded, which depends on the boundedness of the set of lorries in the former case and the set of lollies in the latter. Relevant structures are given in Figure 90 and Figure 91.

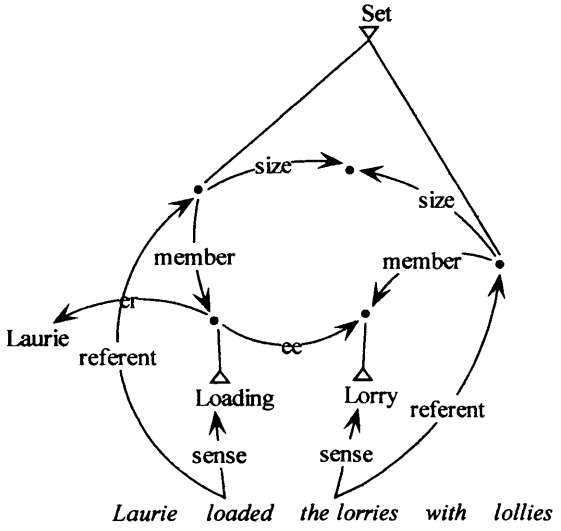

Figure 90 *Laurie loaded the lorries (with lollies).*

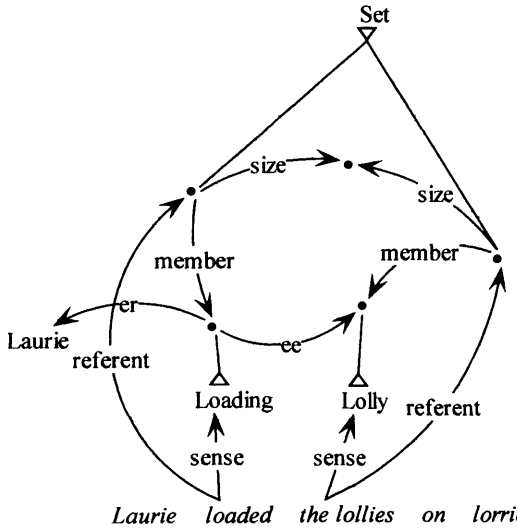

Figure 91 *Laurie loaded the lollies (on lorries).*

4.1.3 Aspect and the event type hierarchy

In this part I have provided WG structures for the various aspectual classes. The structures explain how the aspectual properties of words in constructions are interpreted, and how the aspectual properties of words are reconciled with those of constructions. The mechanism provides for an aspectual classification of verbs not according to the constructions they can appear in, but according to their interpretation in various constructions with aspectual properties (see Croft 1998b: 73-74, and above 4.1.1). The classification is given in terms of detailed analyses of the aspectual properties of the words and constructions and the details of their interaction, which flow from the network structure of WG.

Because the elements in the network (both concepts and relationships between them) are classified according to their properties, generalisations over words, semantic classes, dependencies or other associations are represented in classes in a set of interdependent hierarchies. In this structure a statement like "verbs profiling telic processes can appear with an IN referring to the time taken to complete them" is equivalent to one like "when a verb appears with an IN referring to the time taken to complete some profiled event, that event is a telic process".

In detailing the aspectual properties of words and constructions above, I have integrated the event type hierarchy in 3.1.4.2 with the aspectual structure given in this chapter in Figure 72ff. The distinction between states and events is preserved in the separation of Stuff from Things and the requirements of aspect (and of the classification of noun referents) add the sets and aggregates to this structure. The use of sets and aggregates in the representation of complex events and processes makes available a mechanism for constructing the interpretations of expressions not provided (to my knowledge) in any other framework, one that is explored more fully in the remainder of this chapter.

In Figure 90 and Figure 91, I give structures for two alternative interpretations of utterances using the verb LOAD. The difference between the two interpretations derives from the way the ee is selected from among the thematic arguments of the sense (as described in the previous chapter). However, it is also possible for the linking relationships er and ee to be associated with thematic arguments of extensions of the

sense. For example in Figure 78 I give a structure for *Wally walks* where the referent is an aggregate whose substance is an instantiation of the verb's sense and which is construed as a stable property of the referent of the subject, which is therefore its theme and its er.

In the second half of this chapter I explore the properties of resultative expressions and I develop an analysis where (some) resultative expressions involve the result as a thematic associate of an extension of the verb's sense. For example, in *Freddy leapfrogged himself into the record books*, it is not the case that each individual leap took Freddy into the record books, rather that all the leaps taken together (as a set) had that result. This argument applies to some verbs of motion also: *Skippy bounced into the room* refers to a set of bounces (up and down movements) whose joint result is Skippy being in the room.

4.2 Resultative expressions

4.2.1 Introduction: the direct object restriction; unaccusativity; control and ECM; a resultative construction

In the previous chapter (throughout 3.2) I referred to the ability of some verbs to take a resultative expression (henceforth RE), usually an adjective or preposition, and claimed that this ability varied with the inherent aspectual properties of the verb. In the present chapter I look rather more closely at these expressions (exemplified in (291)-(295)), determining the nature of the control exercised over their use by verbal semantics.

(291) Billy broke the brolly in half.
(292) The brolly broke in half.
(293) Smithy beat the metal flat.
(294) Neddy bled to death.
(295) We drank the bar dry.

I begin by looking at the distribution of REs in English and the constraints on their interpretation. I consider some existing approaches to their analysis and present an

approach in terms of WG structures, showing how the relevant patterns can be represented in this framework.

Elsewhere, I discuss differences between the linking mechanisms assumed by the current analysis and those assumed by Levin and Rappaport Hovav, and note some consequences they have for the treatment of the 'causative alternation' (see chiefly 5.2). Among these consequences is that in WG, unlike Levin and Rappaport Hovav's analysis, there is no syntactic unaccusativity, the observable differences between unergative and unaccusative constructions being described in terms of semantic structure alone. It is for this reason that REs must be dealt with here, since they are taken by some writers (including Levin and Rappaport Hovav, who give 45 pages to them (1995: 33-78)) to provide evidence for syntactic unaccusativity.

For Levin and Rappaport Hovav[31] some verbs have unaccusative Predicate Argument Structures (PASs), which have a single internal argument and therefore conflict with unergative PASs, which have a single external argument. Whether projected from monadic unaccusative thematic structures or from dyadic causative thematic structures (with decausativisation) these unaccusative PASs project in turn onto unaccusative deep syntactic structures. These structures have objects, but no subjects, since the internal argument always projects into object position (the deep objects are transformed into surface subjects somehow). Unergative syntactic structures are projected from unergative PASs and the external argument projects into subject position.

The WG analysis differs from the one just sketched in that there are no differences between unergative and unaccusative syntactic structures. WG is monostratal and there is therefore no question of having deep-structure objects in the latter case. I show in the following chapter that this does not prove an obstacle in the description of the causative alternation (also used by Levin and Rappaport Hovav as evidence for syntactic unaccusativity), and argue that the purely semantic characterisation is a positive benefit in the descriptive work (for example in the treatment of verbs like ROLL that have both unaccusative and unergative uses). In this chapter I start by considering some of the reasons why REs are considered to offer

[31] These comments apply to Levin and Rappaport Hovav 1995. Rappaprt Hovav and Levin 200, which I have not yet read, gives a very different analysis, I am told.

such good support to the notion of syntactic unaccusativity, and go on to demonstrate that (in the WG framework at least), they too can be fully characterised without recourse to syntactic unaccusativity.

Levin and Rappaport Hovav (1995: 33) propose a universal restriction on resultatives, the Direct Object Restriction (DOR), according to which an RE can only be predicated of its parent's direct object. In support of this proposal, they advance examples like (296)-(298). Causative constructions (296) can have REs predicated of the surface object, whereas unaccusative constructions (297) (which under the Unaccusative Hypothesis have deep syntactic objects) are like passives (298) in that they can have REs predicated of the surface subject.

(296) The cold snap froze the lake solid.
(297) The lake froze solid.
(298) The lake was frozen solid overnight.

Since passive and unaccusative constructions both involve deep objects moved to subject position, under Levin and Rappaport Hovav's analysis, both (297) and (298) conform to the DOR at the deep level.

Further, Levin and Rappaport Hovav point to examples like (299) and (300) that show transitive and unergative activity verbs used with REs. Where the object refers to the affected argument (299), the RE is predicated of the object, just as in (296). However, where the subject refers to the affected argument (300), the RE may not be predicated of the subject and a (coreferential) 'dummy' reflexive object must be used.

(299) Molly shook the dolly to pieces.
(300) The engine shook *(itself) to pieces.

Evidently, these examples present something of a problem in an analysis where unaccusative verbs do not have deep structure objects. REs in unergative constructions do appear to conform to the DOR, yet those in unaccusative constructions do not. In the following section I show that the different behaviours of unaccusative and

unergative verbs can be accounted for on the basis of semantic differences alone. I show that the difference between the REs in (297) and (300) is that the former, but not the latter is selected by its parent. I go on to show that only non-selected REs conform to the DOR, which is a general constraint on raising (ECM) constructions. Selected REs, which are control constructions, are not affected by the DOR.

Another problem that will be addressed is that of verbs apparently able to appear in constructions matching both of the patterns identified above. (301) and (302) show that verbs like STARVE and JUMP can be used (as if they were unaccusative like (297)) with REs predicated of their surface subjects (the (a) examples) and (as if they were unergative like (300)) with REs predicated of dummy objects (the (b) examples).

(301) a. Stevie starved to death in the mountains after the plane crash.

b. Stevie is starving herself to death in protest at the prison conditions.

(302) a. Jimmy jumped clear of the falling debris.

b. Whenever he feels bad, Jimmy just jumps himself jolly.

These examples highlight another important difference between the WG treatment of linking and that proposed by Levin and Rappaport Hovav (1995). In discussing the 'causative alternation' in the following chapter, I contrast Levin and Rappaport Hovav's approach, where the syntactic constructions a verb appears in are determined by the verb's semantic class (unaccusative verbs appearing in unaccusative constructions, unergative verbs in unergative constructions and so on), with the WG analysis, where unaccusative and unergative are the names of constructions, defined by pairings of syntactic and semantic relationships (subject with theme or agent), and the ability of a verb to appear in a given construction is determined by the extent to which the construction matches with individual structural properties of the verb's semantics. This difference is relevant to the analysis of examples like (301) and (302), since the class-based analysis requires that verbs appearing with more than one kind of RE be treated as polysemous (or otherwise ambiguous), with the two senses (necessarily of different classes) being linked by some type-shifting operation. In a construction-based approach such as that advocated here, the verbs concerned can be analysed as

monosemous (though of course they need not be), as long as their sense supports both kinds of construction.

A third issue that is significant in the treatment of REs concerns the relationship between the verb and the subject of the RE. Hoekstra (1988, 1992) and Stowell (1983, 1995) propose analyses where all REs are small clauses in the sense of Williams (1975). Under these analyses, the subject of the resultative predicate is not projected by the verb: it is not a verbal argument, but fills the specifier position in the small clause. In this way, resultative constructions have effectively the same structure as ECM constructions (see Radford 1997: 13, 21). Levin and Rappaport Hovav (1995) and Carrier and Randall (1992) argue against this approach, suggesting instead that (in line with the Projection Principle (Chomsky 1981)) lexically causative and unaccusative verbs must project their internal arguments in the same way in the presence of an RE as in its absence, so that resultatives with these verbs must be analysed as control constructions: the shared argument is projected (case-marked) by the verb.

Carrier and Randall note that some approaches propose different syntactic structures for control and ECM resultatives, a small clause structure for the latter and a verbal complement structure for the former. However, they advance arguments from control and binding evidence (as well as from lexical operations) against this approach, preferring an analysis where the post-verbal noun and the resultative predicate are both sisters of the verb.

In WG, ECM and control constructions have the same syntactic structures, differing only as to their semantics: the shared argument in a control construction refers to a semantic argument of the sense of the verb, whereas the shared argument in an ECM construction does not. The difference between these two types of construction is explored below.

These three issues (the DOR, semantic classes of verbs, and the question of control/ECM structures), among others, are addressed in the following sections. There I look closely at the behaviour of REs and develop an analysis in terms of WG semantic structures. For the purposes of the analysis I distinguish three types of RE, justifying this classification by showing that it allows for a full characterisation of the data. The three types are distinguished by the different lexical properties of the verbs

that participate in them, particularly inherent aspectual properties, so this part of the chapter throws further light on the issues of aspect discussed in the first part.

The analysis developed here amounts to the proposal of a resultative construction, like those used in the previous chapters for subject and object linking. This construction corresponds to a linking rule linking the semantic relationship **result** with the syntactic relationship **sharer**. One interesting consequence of this is that it gives special status to the result relationship, in that it is centrally involved in syntactic processes. Like er and ee, result has special status because it corresponds regularly with a defined syntactic relationship. This is not particularly surprising since the definitions of er and ee given above made explicit reference to force-dynamic structure, which is of course itself partly defined in terms of the result relationship.

The three types of RE are discussed separately in each of the following three sections (4.2.2.1-4.2.2.3). 4.2.2.4 deals with verbs that show variable behaviour with respect to the resultative construction and 4.2.2.5 deals with a further set of verbs showing variable behaviour. In the final section I summarise the findings about the structures of REs and discuss their relevance to the theoretical issues.

4.2.2 The resultative construction(s): REs with resultative verbs, argument and non-argument REs

4.2.2.1 Resultative expressions with resultative verbs

Many verbs, like KILL, DIE and BREAK, profile a telic event (one with a result). Sometimes, these verbs can be used with an adverbial element referring to the lexical result, and making it more specific. This element may be a particle (303), an adjective (304) or a preposition (305).

(303) a. Billie broke the buggy up.
b. The buggy broke up.
(304) a. Billie broke the safe open.
b. The safe broke open.
(305) a. Billie broke the brolly in half/to pieces.
b. The brolly broke in half/to pieces.

When the RE is a preposition or a particle, it can profile a change of state (*to pieces*) or the end state (*in half*). Adjectives can only profile the end state. This is not surprising since, as I show in 3.2, prepositions can generally be used alongside the verbs of motion with one of these two meanings, while adjectives generally profile states. In many cases an adjective exists which profiles just exactly the lexical result of a resultative verb. These adjectives can not be used as REs with their corresponding verbs, presumably because they do not add anything to the interpretation. Phenomena of this sort are discussed by Cruse (1985: 105) under the label **encapsulation**: the sense of BREAK encapsulates that of BROKEN.

(306) *Billie broke the brolly broken.
(307) ?Kathy killed the kitten dead.
(308) *The doggy died dead.

However, the RE must be compatible with the lexical result; usually this means that it must instantiate (elaborate) it:

(309) Billie broke the brolly apart/to pieces/?crooked/*useless/*into a handy wedge for the door.

This property of REs with resultative verbs is often described in terms of the inappropriacy of sentences referring to events with more than termination/result (see for example Levin and Rappaport Hovav (1995: 55), Ritter and Rosen (1998)). If the brolly has been broken then the (breaking) event is complete, and for the brolly to be further changed into a handy wedge amounts to a second event. Notice that this is not a constraint on the structure of events in the world, or on conceptual structure, but rather a constraint on the representation of events in syntactic structure:

(310) Billie broke the brolly, making it into a handy wedge for the door.

Since the RE in these cases is semantically selected by the verb, it must form part of its lexical semantic structure. The lexical structures presented for these verbs in

the following chapter explicitly contain a result, as predicted. The lexical structures of resultative verbs also determine which argument undergoes the change:

(311) Allie arrived (*Polly) in Amsterdam.
(312) Kitty cut *(Kathy) in half.

The er of Arriving, the sense of *arrived*, a verb with unaccusative semantics, is marked by its lexical structure as the undergoer, the er of the result state. However, in the case of Cutting, the sense of *cut*, an obligatorily causative verb, it is the ee that is marked as undergoer. These examples present few problems, since they are (must be) controlled largely by the lexical structure of the relevant verbs. However, there are cases that show more complicated behaviour, which I investigate in the following section.

The examples in this section are clearly fully controlled by lexical structures. The verbs to which they apply are inherently (ie lexically) resultative and the RE refers to the lexical result of the verb concerned. This is why the verb exercises semantic control over the RE (see (309) above), and it is also why the verb determines which of its arguments the RE is predicated of (see (311), (312)).

The semantic structure of an RE involves sharing (see Figure 92: Breaking/u shares its er with Breaking/c and Broken shares with Breaking/u), so that it makes sense to assign a sharing analysis to the syntactic structure too (see Figure 93, Figure 94). Another, more compelling reason for using a sharing relationship is presented in 4.2.2.3.

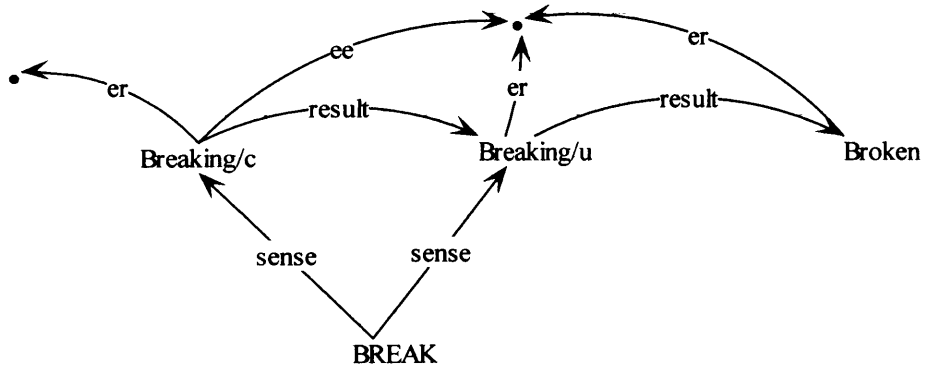

Figure 92 Breaking.

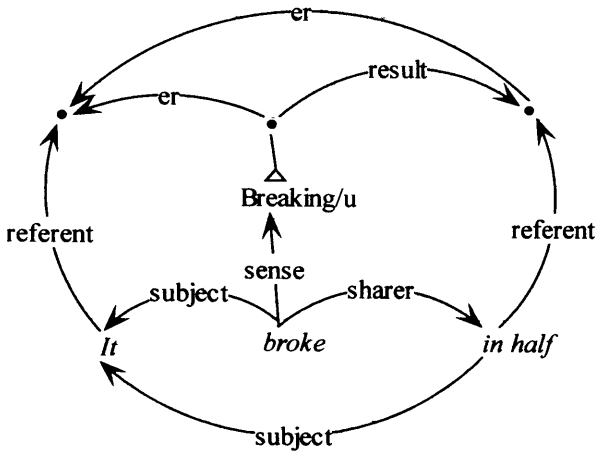

Figure 93 *It broke in half.*

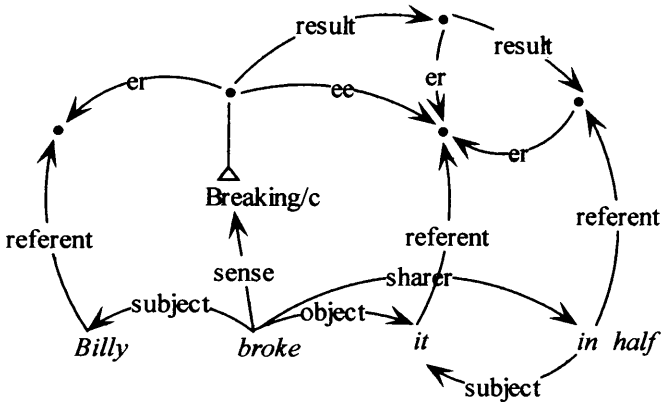

Figure 94 *Billy broke it in half.*

The pattern in Figure 93 and Figure 94 generalises over all resultative verbs, as shown in Figure 95:

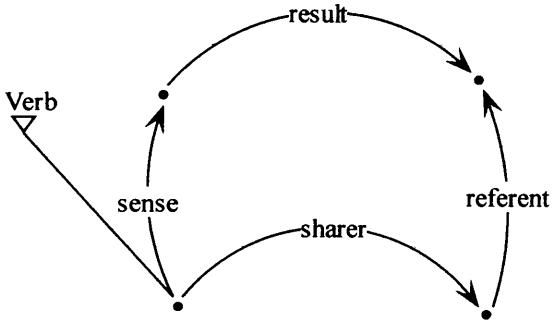

Figure 95 Result linking rule.

The generalisation in Figure 95 represents a linking rule for sharers: some sharers refer to the result of their parent's sense. This is not the only possible linking arrangement

for sharers, since some are controlled by the lexical structure of the parent (those found with verbs like WANT and REFUSE for example), and others follow other regularities (for example sharers in depictive constructions).

Following the generalisation in Figure 95, verbs that have results in their semantic structures can take a sharer referring to that result. The argument of the result will be an argument of the sense of the verb, since the verb not only specifies the nature of the event affecting this argument but also defines its semantic properties directly. In this way, the subject of the sharer is selected by the lexical structure of the verb. An obligatorily causative verb like CUT, whose object refers to the affected argument, shares its object with the sharer, whereas an unaccusative verb like ARRIVE shares its subject. Lexically resultative verbs (semantically) select the RE itself in the same way. Since the lexical structure of, say, BREAK specifies that the result is Broken, if a token of BREAK is to be used with a sharer of the kind shown in Figure 95 then the word filling the sharer role must be able to refer to an instance of Broken.

The exclusion of REs when their meaning too closely matches part of the lexical semantic structure (seen in (306)-(308)) can be explained (as suggested there) in terms of **encapsulation** (Cruse (1986: 105). Cruse treats it as a defining property of syntactic dependents that their senses cannot be encapsulated by those of the parent without semantic anomaly. Cruse's examples are *?a male uncle* and *?Arthur drinks liquids*, which are both pleonastic since the dependents (the adjunct *male* and the object *liquids*) contribute nothing that is not already represented in the lexical semantic structure of the parent. Clearly the same principle applies to (306)-(308).

Transitive resultative verbs can freely appear in passive constructions, with or without REs (313). These passives can be interpreted non-statively (314), or statively (315).

(313) The buggy was broken (in bits) (by Billie).
(314) The buggy was/got broken to pieces in Billie's savage attack.
(315) The buggy was/is completely broken after Billie's savage attack.

The structures I give for these verbs in the following chapter (5.2.3) include both a causing event and a state which serve as the senses for the participles in (314) and (315) respectively:

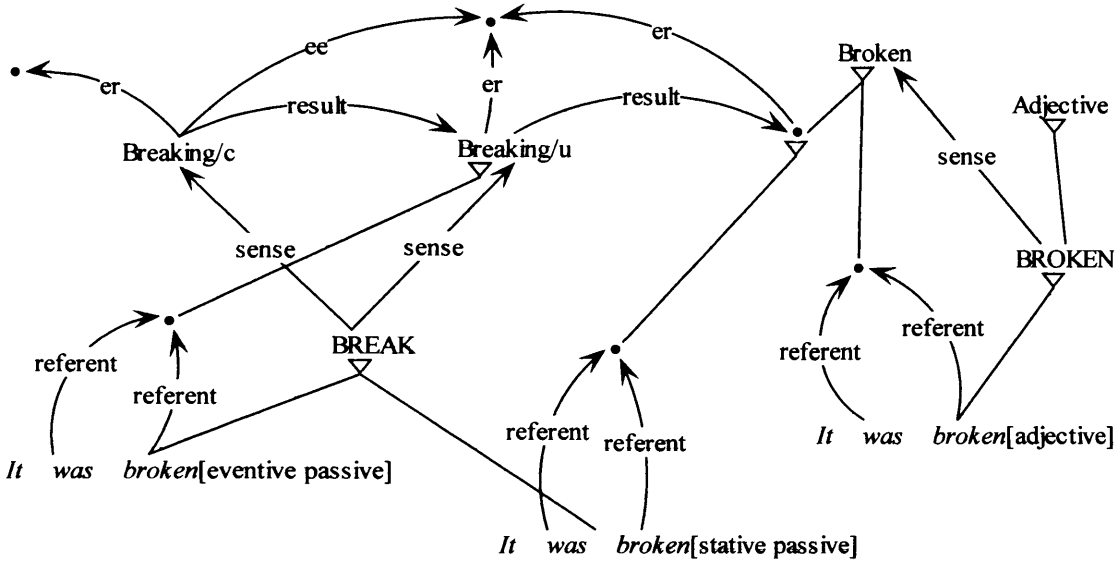

Figure 96 *It was broken*, three ways.

Not all transitive resultatives permit stative passives, however. The verbs of killing, ASSASSINATE, MURDER, DROWN, etc, are distinguished only by properties of the causing event. For this reason, they cannot be used in stative passives: the state in all cases is the same – Dead. Other causative verbs do permit stative passives; for example, CUT, DICE, DRILL, GRIND etc are differentiated by the instrument used in the causing event, but also by the nature of the result state:

(316) By the time Dicky had finished with it, the meat was ground, not diced.

It should be expected that any verb with a lexical result will permit a stative passive, since this is the part of lexical structure that the stative passive construction exploits. The exceptions (KILL etc) are motivated by thematic properties of the relevant verbs, in this case the salience in their thematic structure of the agent. A similar argument is presented in 3.2.1 and in 5.2.3.5 to explain the absence of unaccusative uses of these verbs.

As stated in the following chapter, resultative verbs that permit causative constructions also permit middles. In fact these verbs make for prototypical middle constructions.

(317) This buggy breaks (in half) easily.
(318) The bread won't cut (into slices).

The semantic properties of the middle construction are well documented (and were discussed in 1.2.5). The expression is interpreted generically, with no fixed time reference or causer; the referent of the subject is interpreted as having the necessary properties that enable it to be brought into the result state (or that prevent it in the case of negative middles (318)). Middles formed with causatives have all these properties. The subject refers to the ee of the causing event, which has the necessary properties by virtue of filling a selected thematic role. The verb's profile defines the expected result state. Lexically resultative verbs can form middles with or without an RE. However, as I showed in the previous chapter, and as further discussed in the following sections, because of the importance of the result in the middle construction, verbs that do not have lexical results can only form a middle when an RE is present.

There are some verbs profiling changes of state which do not necessarily receive telic interpretations. FRY, for example, profiles a (possibly causative) process affecting some entity (usually an item of food, of course). This process may be telic (applying heat to something through the medium of oil until it is fried) or it may not (simply applying heat to something through the medium of oil).

(319) The fritter fried in/for five minutes.
(320) Freddy fried the fritter in/for five minutes.

Often the telicity of sentences containing such verbs can be determined by the context. As discussed above, Jackendoff (1992) shows that EAT is interpreted telically when it has a bounded direct object, and therefore excludes delimiting expressions like *until dawn* (321). GRIND behaves similarly (322).

(321) a. Etty ate hotdogs until dawn.

b. *Etty ate half a dozen hotdogs until dawn.

(322) a. Gary ground coffee until dawn.

b. *Gary ground a pound of coffee until dawn.

These verbs can also receive a telic interpretation from the presence of an accompanying (lexically selected) RE (notice that without the RE these examples are ambiguous as to telicity, since definiteness does not entail boundedness: *We ate the hotdogs/ground the coffee in/for five minutes*).

(323) We ate the hotdogs up/%down/*gone (in/*for five minutes).[32]

(324) We ground the coffee up/down/coarse/to a fine powder/?fluffy/*ready.

However, they can also be used with non-selected REs, predicated of non-selected direct objects (325). This construction excludes the selected object (326), and is only possible for verbs that are able to appear without selected objects (compare (327) and (328)).

(325) a. Etty ate herself silly.

b. Windy ground the mill stones smooth.

(326) a. *Etty ate hotdogs herself silly.

b. *Windy ground the wheat the mill stones smooth.

(327) a. Etty ate (until dawn).

b. Gary ground (until dawn) (while Rosie roasted).

(328) a. The spring sunshine melted *(the snow).

b. *The spring sunshine melted the road impassable.

[32] Selected REs with EAT are very highly constrained. Only UP (and for some DOWN) are really acceptable. The lexical result of Eating is already very specific (the ee is inside the er), which may explain the constraint (recall the encapsulation argument given above). UP and DOWN are commonly used as resultative particles highlighting the completion of the event, but allowing the verb itself to specify the exact nature of the result.

REs of the kind seen in (325) are discussed in 4.2.2.3; the properties of verbs that permit more than one kind of RE are discussed in 4.2.2.4.

4.2.2.2 Resultative expressions with non-resultative verbs: verbal arguments

(329) Smithy beat the metal flat.
(330) Sooty swept the floor clean.
(331) Slippery Sid skidded into a ditch.
(332) Benjy bled (the bull) to death.

The verbs in (329)-(332) are not by themselves telic (*Smithy beat the metal/swept the floor/skidded/bled for/*in ten minutes*), yet the constructions are. Their telicity derives from the adverbial expression, which is interpreted as a result.

Though their lexical structures do not entail a result, these verbs nevertheless exercise semantic control over the RE:

(333) Smithy beat the metal flat/into a saucepan/into the ground/?shiny/*expensive.
(334) Sooty swept the floor clean/spotless/free of dust/?shiny/*smart/*hygienic.
(335) Slippery Sid skidded into a ditch/off the track/away/*hurt/*disqualified.
(336) Benjy bled dry/to death/ *sickly/*sticky.

The thematic role filled by the referent of the object in (333)-(334) and that of the subject in (335)-(336) are determined by the lexical structure of the verb; these are selected arguments: *Smithy beat the metal/*the theory (flat)*. Since the verb determines the nature of the action carried out and the role played in that action by the relevant argument, it also constrains the kinds of result that the action may have.

Semantic constraints of this kind on the RE are discussed by Wechsler (1997: 309), who appeals to the 'canonical' result of the event specified. Croft (1998b: 42-43), dealing with an example like (335) (*She swam across the pool*), treats the RE as an extension to the end of the causal (force-dynamic) chain, the nature of which is determined by the lexical profile of the verb. Levin and Rappaport Hovav (1995) do not discuss semantic constraints of this kind.

The problem with these examples is that, while the result state should not appear in the lexical semantic structure of the verb since these verbs are not lexically telic, lexical structure must nevertheless provide some means of choosing between result states. My claim is that it achieves this by specifying the semantic properties of the shared argument, and of the process affecting it, and so constrains the set of possible (plausible) results. The analysis I gave above for manner of motion verbs with direction adverbials also captures Dowty's canonical result in the close association between activities which can be manners of motion, and the motion events they can be the manners of.

The act of skidding, for example, entails that the skidder follows a path, so it must be a concrete object capable of changing location. Since the change that appears in the lexical structure of the verb is a change of location, if the verb is to be interpreted telically, the result state must be a location. This may be expressed by a preposition or particle profiling the end state (*into a ditch, away*) or by a preposition profiling the beginning of the path (*off the track*). Motion verbs like SKID have a path in their thematic structure, which can be elaborated by a telic path expression. A telic path has the properties both of paths, and of results. The behaviour of motion verbs is discussed at length in the previous chapter.

Similarly, the act of beating entails that the beatee is a concrete object, and that it is (usually repeatedly) struck with force. The application of force by the beater to the beatee leads this argument to be interpreted as a patient, so it is necessarily affected by any change that results from the beating. Furthermore, beating can only bring about certain kinds of change: a change of shape, orientation or location (see (333)).

Carrier and Randall (1992), in their footnote 43, consider and reject a similar account for semantic selection of results which they attribute to an anonymous reviewer. They raise two objections to the account. The first is not relevant to the current account since it derives from limits on control imposed by phrase structure which do not apply in WG. The second objection is incorrect: they claim that "result APs in *–ing* and *–ed* are semantically incompatible with resultatives" and that this incompatibility can only be described in terms of the semantic relationship between the verb and the RE; however, since this restriction applies to all REs (even those that are not semantically selected) it cannot be a semantic restriction.

The object in examples like (333) and (334) is a normal object: it is selected by the verb (see my arguments in 1.2.1 for treating objects in the same way regardless of the other constructions in the sentence). For this reason, these verbs can appear freely in passive constructions, with or without the RE:

(337) The metal was beaten (flat).
(338) The floor was swept (clean).

However, without the RE both (337) and (338) can only be interpreted eventively. The stative passive is impossible without the RE since the verbs do not themselves profile an end state. With the RE both can be interpreted statively:

(339) I'm not letting you go until that metal is beaten *(flat).
(340) I'm not coming in until that floor is swept ?(clean).

As noted by Levin (1993: 26) and Levin and Rappaport Hovav (1995: 43) (see also 4.2.2.1), processive verbs also permit middles in the presence of an RE ((341) and (342)). BLEED permits a middle construction even in the absence of an RE (343). Without the RE, this middle still receives a telic interpretation, in this case an inchoative one: it is easy to cause a haemophiliac to **start** bleeding.

(341) The brass won't beat *(flat).
(342) New Sno-wite carpet tiles just sweep *(clean)!
(343) Haemophiliacs bleed (to death) easily.

Since the objects in these examples refer to arguments of the senses of the verb, they are clearly able to affect the success of carrying out the action, but the RE (or some other property that confers telicity) must be there if the construction is to fulfil the other criterion for middles identified above: that the properties of the ee are such that it is easy/difficult to bring it into **a specified state**. It is for this reason that middles are generally only permitted with processive verbs when an RE is present.

The middle construction is a good test for telicity. Lexically telic (causative) verbs permit middles under all circumstances, whereas non-telic verbs do so only when some other element confers telicity on the whole construct. As noted above, the interpretation of the middle construction is that the referent of the subject is responsible for the ease, or otherwise, of performing the profiled action. In the case of non-resultative beating, only the beater can be responsible for the success of the beating (for example, he or she must have hands). However, when a result is specified, the beatee is able to influence the achievement of that result (beating lead flat is easier than beating steel flat). In (333) (*Smithy beat the metal flat*), as shown in Figure 97 below, the referent is a set of blows whose combined result is the flatness of the metal (the referent of *metal* is a thematic argument of this set as well as of its members); in (341) (*The brass won't beat flat*), it is this result that provides the telic interpretation required by the middle construction and it is the thematic relationship between the set and its patient that allows the latter to determine the success of the profiled activity.

The REs in this section have the following properties: they are predicated of a lexical argument of the verb (the shared argument is semantically selected, the relevant verbs allow eventive passives with those arguments even in the absence of an RE); they are able to coerce an otherwise non-telic verb into a telic interpretation (thus one that allows both stative passives and middles); and they are controlled semantically by the verb (though perhaps not as strongly as those in the previous section). These properties must follow from the lexical structures of the relevant verbs, and from the structure of the resultative construction. Figure 97 shows a simplified structure for *Smithy beat the metal flat*. *beat* has a sharer, *flat*, with which it shares its object; Beating, the sense of *beat*, selects its er and ee in the usual way (see Figure 98); the category C, which isa Beating, has a result defined by the sharer whose argument is (by the definition of result) the Patient of C.

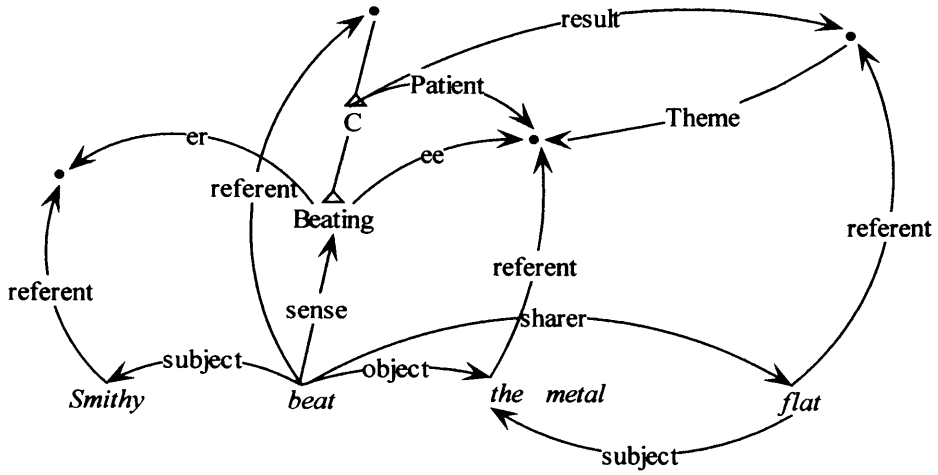

Figure 97 *Smithy beat the metal flat.*

Structurally, these REs do not differ significantly from those discussed in the previous section (see Figure 93, Figure 94). The verb has a sharer referring to the result of its sense. The affected argument (the er of the result) is an argument of the verb (fills a thematic role in the structure of its sense).

The important difference between the two constructions is that they are differently motivated. The REs in the previous section are fully controlled by the lexical structures of the relevant verbs; control over those in this section is shared between the lexical structure of the verb and that of the resultative construction. A verb like BEAT has no (profiled) lexical result; it is inherently processive. Figure 98 gives a possible lexical semantic structure for the verb. Beating, it is claimed, is a process consisting of multiple hitting events. The ee of Beating is the same as the ee of the result of the Hitting (recall that in chapter 1 I defended an analysis of HIT where the result of Hitting isa Touching (Figure 27)).

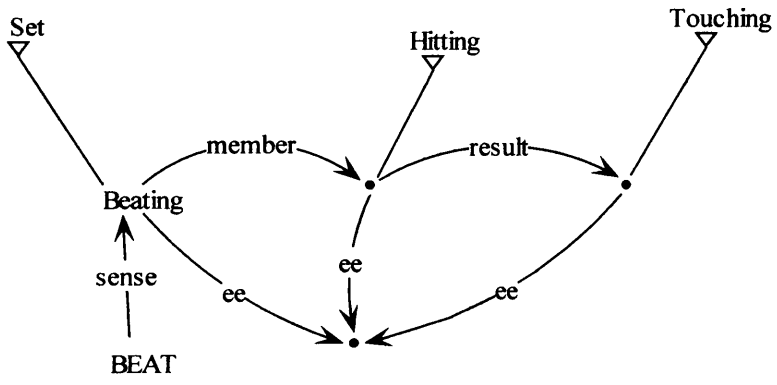

Figure 98 BEAT.

Because of the relationship between the ee of Beating and the result of Hitting, BEAT selects just the same semantic properties as HIT. Because Beating has itself no built in result, it can receive one from the linguistic context (notice that this is not possible for Hitting, since Hitting does have a built in result, the touching event: *Hatty hit the metal against the wall/*flat*). This contextual result can be controlled by the resultative construction identified in the previous section. The result-sharer linking rule (Figure 95) provides an interpretation for sharers used with these verbs. The RE is (following the properties of results) predicated of the argument identified as affected in the lexical structure of the verb.

Figure 99 shows a simplified structure for *Benjy bled to death.* Bleeding has a sense which is an aggregate whose er is the patient of its substance. The concept C, intermediate between the sense and the referent, has a result which shares the same patient; this is mediated by the same structures that were applied to similar constructs involving path verbs (compare *Benjy dropped to his knees*). Bleeding is an unaccusative process: its sense is a set of events affecting the participant; and, just as with the path verbs, these events may between themselves be sufficient to bring about a result (the set itself may be telic).

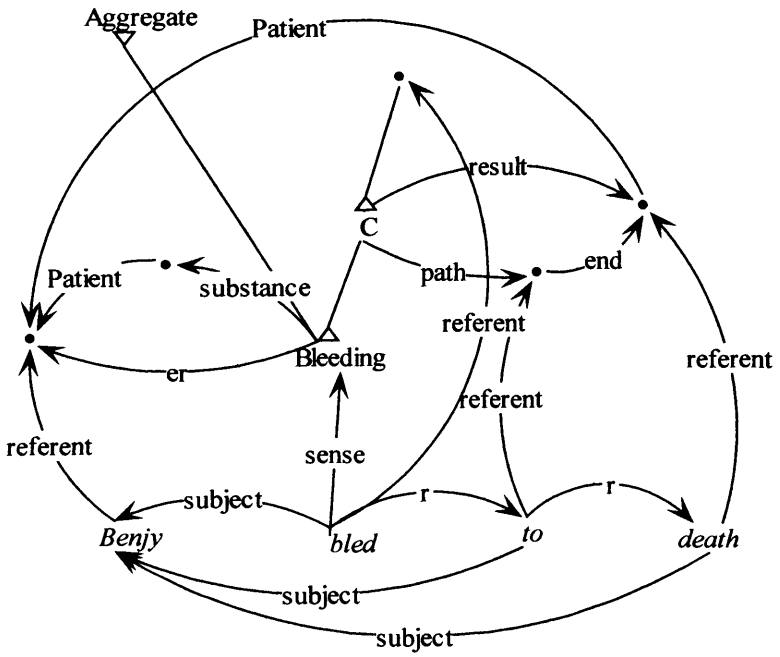

Figure 99 *Benjy bled to death.*

Transitive verbs of the kind discussed in this section support (eventive) passives in the usual way. Stative passives, however, require that the profile contains a result state (see Figure 96); thus these verbs support stative passives only when there is an RE. The same considerations apply to the middle construction.

As before, when the verbs in this section can appear without their selected objects they can also support REs predicated of non-selected objects (344). Verbs with obligatory objects cannot (345). Of course, verbs like BLEED that support causative and unaccusative constructions are interpreted as unaccusative when they appear without objects, and necessarily as causative when they appear with an object; the object in a transitive construction with BLEED must therefore be a selected one (346).

(344) a. Sooty swept.

b. Sooty swept the air full of dust.

(345) a. *Smithy beat.

b. *Smithy beat the room full of sparks.

(346) a. Benjy bled.

b. *Benjy bled the bucket (full).

As before, non-selected REs are discussed in 4.2.2.3 (the following section), and verbs that permit more than one kind of RE are discussed in 4.2.2.4.

4.2.2.3 Resultative expressions with (non-)resultative verbs: non-verbal arguments

(347) Sharnie shouted herself hoarse.

(348) Barney barked him awake.

(349) We laughed Larry off the stage.

(350) Darcy drank the bar dry.

The verbs in (347)-(350) are not by themselves telic, any more than those in (329)-(332) (*Sharnie shouted/barked/laughed/drank for/*in ten minutes*)[33] though, again, the constructions are.

The examples in (347)-(350) differ from those in (329)-(332) above in that the object is not selected by the verb: **Sharnie shouted herself*, **Barney barked him*, **Darcy drank the bar*, **We laughed Larry*. Neither does the verb exercise any semantic control over the RE:

(351) Darcy drank the bar dry, the Russians under the table, himself half crazy and his mother into the poor house.

(352) Terry can talk the birds out of the trees, the voles out of their holes, a corporation omnibus six feet into the air and all the beer from here to Middlesbrough sour in the barrel.

The lexical structure of TALK has no result, and no object or ee, so the properties of the result, and of its argument, are determined entirely by the RE: **Terry talked the table to sleep/the birds sour*. The argument of the result does not fill a thematic role in the lexical semantics of the verb, so the verb cannot select the object.

Though the post verbal noun is not selected as object by the verb, it still clearly is an object. I noted above (4.2.2.1) that some verbs that appear with selected REs and optional objects (like DRINK for example) can also appear with non-selected REs. Levin and Rappaport Hovav (1995: 38) stress that this possibility is not open to verbs with obligatory objects:

(353) The bombing destroyed *(the city).

(354) *The bombing destroyed (the city) the residents homeless.

The thematic argument of DESTROY must appear as the syntactic object, so the verb cannot appear with a non-selected object (only one object is permitted per verb).

[33] These sentences can receive an inchoative interpretation, which is telic: *We tickled Sharnie and Larry with a feather to see who would laugh first. Sharnie laughed in 10 minutes, Larry in 12.* See 4.1.

For Levin and Rappaport Hovav, this lends strong support to the DOR, especially when taken alongside examples like (355) (repeated from above) and (356).

(355) Sharnie shouted herself hoarse.
(356) Danny danced himself dizzy.

In these examples, lexically intransitive verbs[34] are used with non-selected REs. The argument of the result is also an argument of the verb, the shouter and dancer respectively, which is represented by the subject in syntactic structure. Yet the RE demands that its subject be the object of the verb, so a 'dummy' object must be used that corefers with the subject. Non-selected REs apparently do conform to something like the DOR.

The claim that the subjects of non-selected REs are objects of their parents is given further support by their behaviour in passive constructions. As well as permitting passives with the lexical object as subject, verbs like DRINK also permit passives with a non-selected object as subject, though only when there is also an RE (see (357) and (358)). Intransitive verbs also permit passives with non-selected objects in subject position just as long as there is an accompanying RE (359).

(357) The last of the beer was drunk (up) at/by 1 am.
(358) Darcy's mother was drunk into the poor house.
(359) The birds were talked out of the trees.

(357) (which contains an RE like those discussed in 4.2.2.1) can be interpreted either eventively or statively. However, (358) and (359) can only have eventive interpretations (*She is drunk into the poor house* and *They are talked out of the trees* can only be interpreted habitually). This is not surprising: the change of state profiled by non-selected REs is defined only by the RE itself, so the state of having been talked out of a tree is no different from having been charmed, whistled or frightened out. This

[34] Both SHOUT and DANCE can be used with objects in other constructions: *She shouted a battle cry/danced a victory dance.* These are discussed in Chapter 1.

is the same explanation as is offered elsewhere (3.2.1, 4.2.2.1, 5.2.3.5) for the absence both of statively interpreted passives and of unaccusatives with KILL etc.

The REs in this section are not compatible with the middle construction:

(360) *Burton's beers talk sour easily.

(361) Russians just won't drink under the table. [active interpretation only: 'They will not imbibe liquids while under the table'; cf. *won't/can't* <u>*be drunk*</u>)]

These examples satisfy the second condition on middles (that there is a specific result state), but not the first (that the subject fills a thematic role position of the verb).

In summary, REs of this kind can be used with non-telic verbs which are capable of appearing without a selected object. They are predicated of the object of the verb, even if this means using a dummy object. The RE is not selected semantically by the verb; nor is the object. These REs do not support middles or stative passives, though they do support eventive passives. The eventive passive structure is just like that of passives formed with other REs, and the reasons for the exclusion of stative passives and middles have been discussed. The remaining question is why these REs, unlike those discussed in the previous sections, can only be predicated of a direct object.

In their syntactic structures, these REs are no different from the other kinds. The syntactic structure of (350) is shown in the diagram:

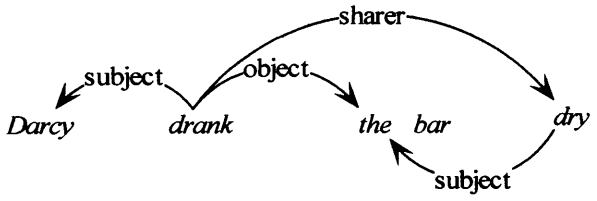

Figure 100 *Darcy drank the bar dry* (syntax).

Semantically, they differ in that, as noted, the affected argument is not an argument of the verb's sense (see Figure 101). Clearly, the object cannot refer to the ee of Drinking in this case, since the ee of Drinking must be a liquid (and must be drunk). In the semantic structure of (350) the sense, Drinking, has its usual properties: the drinker acts causing some liquid to go inside them. However, the referent of the verb has a

different result: the referent is a set of drinking events whose result is the referent of the sharer.

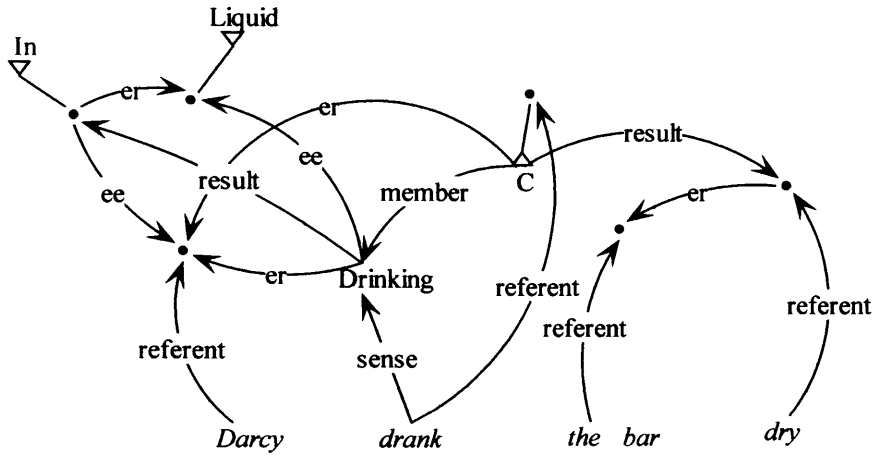

Figure 101 *Darcy drank the bar dry* (semantics).

This is the crucial difference between the REs in this section and the other two kinds. These non-selected REs appear by virtue of the result-sharer linking rule identified above, that links the sharer and the result relationships. By definition they bring their own argument. As noted above, the sharer relationship also appears in other structures, where it is linked to different semantic relationships. These other cases can also be divided into two groups according to whether the shared dependent is selected by the parent. This is the distinction between **control** and **ECM (raising)** constructions. Strikingly, ECM constructions (where the shared dependent is not selected) also conform to the DOR.

Verbs that select ECM constructions (eg CONSIDER, FIND, EXPECT, BELIEVE) select the syntactic properties of their sharers (362), as well as their semantic properties (BELIEVE selects a state specifically, EXPECT allows other kinds of event), but they do not select their objects, which are instead selected by the sharer (363).

(362) a. Phillie found Barry (to be) boring.

b. Phillie believed Barry *(to be) boring.

(363) a. I expect the president to be drunk/it to rain.

b. *I expect the table to be drunk/the president to rain.

By contrast, verbs that select control constructions (eg PERSUADE, TELL, CONTINUE, PROMISE, CLAIM) select the sharer, syntactically (364) as well as semantically (365), and the shared dependent (366), also determining which of the verb's dependents is shared (367).

(364) a. Connie continued to wait/waiting.

b. We persuaded her to wait/*waiting.

(365) a. Ralphy refused a million pounds/to eat worms.

b. Polly promised a million pounds/to eat worms.

(366) Percy persuaded the president to speak/*it to rain.

(367) a. Connie continued (*Wally) to wait.

b. Percy persuaded *(the president) to speak.

This pattern provides an explanation for the constraints on predication of REs. Two sharer constructions govern the data. One, a generalisation over the control-type structures, involves a shared semantic argument, whose syntactic role is specified by the parent; the other, a generalisation over the raising-type structures, involves a shared object whose semantic role is determined by the sharer.

The parallel between the two kinds of RE and the control/ECM distinction is noted by, among others, Simpson (1983), Carrier and Randall (1992: 226), and Wechsler (1997: 309), who also suggests that it explains why non-argument REs should conform to the DOR while argument REs do not. Verspoor (1997) develops a single cognitive structure for the meanings of resultatives and 'traditional' control and ECM constructions, including some constructions with properties of both (those profiling performative speech acts like DECLARE, CALL etc).

In this section I have explored the properties of REs predicated of non-arguments of the verb's sense. I begin the following section by summarising the properties of the three different kinds of RE discussed above and go on to investigate the behaviour of those verbs that appear with more than one of the different kinds.

4.2.2.4 Verbs that appear with more than one kind of RE

In the preceding sections I have identified three kinds of RE: **lexical** resultatives (4.2.2.1), non-lexical argument resultatives (hereafter **argument** resultatives) (4.2.2.2) and non-lexical non-argument resultatives (hereafter **non-argument** resultatives) (4.2.2.3). All of these three construction types are telic and in all cases there is an adjective or preposition depending on the verb that refers to the result of the action profiled by the verb. In all cases the RE is predicated of a (syntactic) dependent of the verb (it is a sharer). The other properties discussed above do not apply to all three types. They are presented in the table.

	lexical	argument	non-argument
pred. of (s) subject	☑	☑	☒
eventive passive	☑	☑	☑*
stative passive	☑	☑*	☒
middle	☑	☑*	☒
semantic control	☑	☑	☒

Table 4. Properties of 3 kinds of RE. * with RE only

The non-argument REs are clearly very different from the other two. They may not be predicated of the (surface) subject, they do not permit middles or stative passives and the verb exercises no control over either the RE itself or its argument. Verbs appearing with REs of this type are, by themselves, intransitive so they do not appear in passives of any kind, unless the RE is also present.

The first two types of RE have matching properties: both permit intransitive, middle and passive use and in both cases the verb exercises semantic control over the RE and its argument. The differences between these two types arise from differences between the relevant verbs. Verbs appearing with non-lexical argument REs do not permit the middle or the stative passive unless the RE is present.

Significantly, as noted above, some verbs that permit REs of the first two types apparently also permit REs of the third kind. Here I consider two such verbs (DRINK and PAINT), showing how the properties in the table distinguish between different kinds of RE formed with these verbs. I go on to look at three cases that are apparently

the same (SWEEP, LOAD; manner of motion verbs) to see if the same principle can be applied to their analysis.

(368) a. Dylan drank the beer up.

b. Dylan drank the bar dry.

(369) a. Pablo painted the canvas red.

b. Pablo painted himself into a corner.

In 4.2.2.1 I claimed that EAT is a lexically resultative verb, selecting a very limited set of REs (*up/down*). If this is correct, then it also applies to DRINK (see (368)a). I also noted there that EAT permits unselected REs, when it is used without the selected object. Again, the same applies to DRINK ((368)b). PAINT is apparently not telic by itself (*Pablo painted the canvas for/in half an hour*), though it does allow REs predicated of a selected object ((369)a). PAINT further allows non-selected REs, predicated of non-selected objects ((369)b).

Before looking at the behaviour of these verbs with respect to resultative sharers, I briefly consider their other argument taking properties. Both can be used (without objects) to profile a process/activity. The (a) examples in (370) and (371) refer to ongoing processes, the (b) examples to iterative or habitual states. Both these interpretations are available in the past tense ((370)c and (371)c). These examples are clearly not telic.

(370) a. Dylan is drinking.

b. Dylan drinks.

c. Dylan drank for three days solidly/all his life.

(371) a. Pablo is painting.

b. Pablo paints.

c. Pablo painted for three days solidly/all his life.

Both verbs can be used with direct objects. Objects with DRINK refer to the liquid that is drunk (or to a toast: *Dylan drank a toast to the queen*; this is an idiosyncratic lexical property that is also open to a very few other verbs, like PROPOSE). Objects with PAINT

refer to one of three things: a surface or object to which paint is applied, an image produced by the act of painting or an element depicted in such an image (it is also possible to use the verb with an object referring to the substance that is painted onto the surface, but only when an RE is present; this case is discussed shortly). If the object refers to a bounded entity, the profiled event may be telic (see 4.2.2.1).

(372) Dylan drank a whisky (in/*for five seconds).
(373) Pablo painted a canvas/a picture/Pablito in/*for four hours.

The primary question in the treatment of verbs like PAINT that behave ambiguously with regard to their syntactic arguments is whether they are to be treated as polysemous, in the sense that the structures in (373) are motivated by three different senses, or whether the proper analysis allows three different object linking arrangements on the basis of a single sense (this issue is discussed at length in the following chapter). Conceptually PAINT profiles an activity carried out (usually with an instrument) by an agent, whereby some substance (paint) is applied to some surface; often the activity is central to the process of creating a work of art. This conceptual structure allows the verb to be taken as profiling either an affective activity (altering a surface by painting) or a creative activity (producing an image by painting); because of what we know about images, the subject (the thing depicted) is assigned particular salience, which motivates the third possibility shown above.

This situation does not require us to posit three senses for the verb, since the object relationship is already linked to affected themes and to products and the three alternative construals can be taken as alternative projections of the same semantic structure. However, in the case of PAINT there does seem to be some evidence that the three variants represent separate senses. For example, the interpretation of elliptical constructions must match that of their antecedents ((374)-(375)) (this is the 'zeugma test' Cruse (1986 :13, 21)).

(374) ?Jackson painted his bathroom and Pablo (a picture of) a minotaur.
(375) ?Pablo painted the canvas blue all over and then (a picture of) his son on top.

Verbs like PAINT serve to underline the importance of using semantic properties carefully in determining argument linking (see 1.1.1, Levin and Rappaport Hovav (1995: 9)). PAINT and DRAW could both be called 'verbs of representation', or some such, and they undoubtedly have a lot in common in their conceptual structures. However, DRAW does not support objects referring to the surface to which the substance is applied (*Pablo drew the paper* can only mean that Pablo drew a picture of the paper). This constraint on DRAW is predictable only from what language users know about drawing, as contrasted with painting: drawing does not usually cover the entire surface and the effect on the surface is generally secondary to the production of the image. Because of the effect of language users' knowledge of the world, the semantic structure of DRAW does not assign the affected argument role to the surface, so that the object linking rule cannot apply to this argument.

Compare this with the similar situation of cooking verbs. BOIL allows an object referring to a liquid, which is brought to or kept at boiling point ((376)a), or to a food item cooked by immersion in boiling liquid ((376)b); BAKE allows an object referring to a food item cooked by exposure to hot air ((377)b), or to a food item produced by the exposure of some other element to hot air ((377)c); BOIL does not allow this last alternative ((376)c), nor does BAKE allow the first alternative ascribed to BOIL ((377)a).

(376) a. Borsley boiled the water/milk.

b. Borsley boiled an egg.

c. Borsley boiled *(the wine into) a thick syrup.

(377) a. *Barry baked the air inside the oven.

b. Barry baked a potato.

c. Barry baked (the dough into) a cake.

Both verbs must have all three elements in their conceptual structure (a heat transfer medium, the item to which the heat is applied and the product of that application of heat), but because of a difference in the events profiled they differ as to which of these elements may be expressed as syntactic dependents. A similar argument is advanced in the previous chapter to account for the heterogeneity of the various classes of verbs of motion.

Returning to the verbs at hand, DRINK permits middle constructions (378). PAINT does not permit middles with any of the object arguments identified above in subject position ((379)a-c), though it does allow what look like middles with subjects referring to the substance applied to the surface ((379)d) or to the instrument ((379)e).[35]

(378) Chilean wine drinks easily.

(379) a. *Properly primed woodwork paints more smoothly.

b. *Abstracts paint more quickly than portraits.

c. *People paint more easily than animals.

d. This new emulsion paints wonderfully smoothly.

e. My new brush paints beautifully.

Both verbs support eventive passives, but only DRINK supports stative ones:

(380) a. The wine was drunk by someone in the night.

b. When I arrived the wine was all drunk.

(381) a. The barn was painted by the whole community together.

b. *When I got there the barn was completely painted.

(382) a. The Mona Lisa was painted by da Vinci.

b. *I'm glad to say your portrait is now finally painted Ms Lisa.

(383) a. This famous scene has been painted by all the great artists of our time.

b. *Choose another scene, this one is already painted.

The evidence from middles and stative passives suggests that DRINK, unlike PAINT, is lexically telic: both constructions require that the verb profiles a distinctive end state. This implies that DRINK should be able to take a selected RE, of the kind discussed in 4.2.2.1, and that PAINT (since it clearly has an affected argument) should be able to take an argument RE, of the kind discussed in 4.2.2.2. This prediction is

[35] The acceptability judgments in this section may be questioned by some readers. It has been suggested that PAINT behaves in just the same way as DRINK with respect to these constructions; if this is the case then the comments contrasting the two verbs' behaviour do not apply.

apparently borne out ((384)-(385)); when the object refers to the product, however, PAINT does not permit an RE for the simple reason that the product is the result (386).

(384) Dylan drank the wine up.
(385) Pablo painted the canvas red.
(386) *Pablo painted the portrait valuable/Pablito famous.

However, as noted above, these verbs also permit REs predicated of non-selected objects ((387)-(388)). PAINT additionally permits REs predicated of objects referring to the substance applied to the surface (389); recall that this element can also surface as the subject of a middle construction ((379)d) but note that it cannot appear as object unless the RE is present: **Pablo painted the emulsion.* This pattern is discussed below with regard to similar verbs, like SPRAY and LOAD.

(387) Dylan drank the bar dry.
(388) Pablo painted himself into a corner.
(389) Pablo painted the emulsion onto the wall.

Comparing the properties of the constructions in the examples with those given in Table 4 above makes it clear that these verbs can appear with more than one kind of RE.

- First, neither DRINK nor PAINT can be used intransitively with an RE. By itself this does not help to distinguish between the different examples, but it is clear the examples in (387)-(388) are non-argument REs (*drink yourself silly, paint yourself into a corner*).
- Middle constructions can be made using the REs in the selected examples above, where the result is one canonically associated with the verb, but not with other results ((390)-(391)). Further, contrasting (390) with (378) and (379) above suggests that DRINK is, while PAINT is not, a lexically resultative verb.

(390) a. This young but considered Pinot drinks up wonderfully smoothly.

b. Red walls don't paint white again so easily.

(391) a. *Russians don't drink under the table in five minutes.

b. *At last, a brush the bristles won't paint off!

➢ Stative passives can be made using the canonical REs (392), but not with the other results (393). In 4.2.2.2 above (examples (337)-(340)) I claimed, following Levin and Rappaport Hovav (1995: 43-44), that non-selected REs did not permit stative interpretation in the passive. The examples in (393) are, as we would expect, unacceptable. However, some passives formed with non-argument REs can apparently have a stative interpretation (394). It is unclear whether this is a general property of non-argument REs (in which case Levin and Rappaport Hovav's claim is wrong) or an exceptional stative passive licensed by some highly conventional idiomatic constructions.

(392) a. They won't let you leave till all the wine is drunk (up).

b. I'm not moving in until the whole flat is painted (white).

(393) a. *Dylan won't rest until his mother is drunk right into the poor house.

b. *I can't do any more: the bristles are painted right off my brush.

(394) - Can I have a beer please?

- No, I'm sorry sir. The bar is/we are drunk dry.

➢ Both kinds of RE permit eventive passives. Without the RE the verbs permit passives only when the object is the one selected by the verb:

(395) a. They won't let you leave till the wine is drunk (up).

b. I'm not moving in until the flat is painted (white).

(396) a. Dylan won't rest until his mother has been drunk *(into the poor house).

b. I can't do any more: the bristles have been painted *(off my brush).

As noted above (4.2.2.3), this is not surprising since in the absence of the RE the verbs cannot appear in active constructions with the objects in the (396) examples (without implausibility: *He drank his mother/painted the bristles* have highly

unlikely meanings). This confirms that these examples are cases of non-argument REs; (395) confirms that these verbs can nevertheless be used with REs predicated of selected verbal arguments.

In summary, DRINK appears to be a lexically selected telic verb whose profile includes a drinker, a (liquid) drinkee and the action of the former on the latter, that results in the drinkee being contained by the drinker (or perhaps simply absent). It appears that PAINT inherently profiles an activity, carried out by a painter (using an instrument). There are (at least) two other participants that are plausibly affected by the activity: the paint and the surface to which it is applied. The choice between these two arguments as paintee is discussed shortly, but from the above discussion it is clear that the surface can appear as affected argument, whether or not the profiled event is telic. Telic painting can result in a product (a painting) or in a change in the state of the surface.

Both verbs can be used in non-telic constructions, with objects with unbounded referents or without objects altogether, and therefore also in telic constructions where the result is not that defined by the profile of the verb. These constructions conform to the general requirements on resultative sharers.

4.2.2.5 Other verbs showing variable behaviour

The tests given in Table 4 can be used to shed some light on another well-known case of variability: that of verbs like SWEEP and WIPE, Levin and Rappaport Hovav's (1991) 'verbs of clearing', and perhaps also that of verbs like SPRAY and LOAD (see 3.2.3.3, 4.1.2.6). Verbs of both of these kinds can appear with REs predicated of a direct object referring to a location or to something removed from or placed at that location. They can also all appear with non-selected REs predicated of non-arguments. Typically the location-object and locatum-object variants of these verbs are treated as separate lexemes related by derivation (Levin and Rappaport Hovav 1995, Jackendoff 1990), though some (eg Dowty 1991) argue for a single lexical representation, claiming that differences in interpretation are predictable on the basis of differences in the construction. If both location-object and locatum-object REs can be shown to be

argument resultatives then it is at least clear that the profile of the verb must permit either location or locatum as its ee, however this is to be mediated.

(397) a. Sooty swept the path clear.

b. Sooty swept the crumbs off the floor.

c. Sooty swept himself exhausted/the bristles off the broom.

(398) a. Laurie loaded the lorry full.

b. Laurie loaded the lolly on the lorry.[36]

c. Laurie loaded himself exhausted/his back sore.

➢ REs predicated both of the location and of the locatum allow middles (though the location-object example with LOAD is doubtful); REs predicated of non-arguments do not:

(399) a. New Sno-wite carpet tiles just sweep clean!

b. ?My new Loadalot lorry doesn't load full in a hurry!

(400) a. Coffee grounds don't sweep up easily.

b. The safe won't load into that lorry without a forklift.

(401) a. *At last, a broom the bristles won't sweep off!

b. *Straight backs don't load sore.

➢ Both kinds of argument RE also permit stative passives, whereas non-argument REs do not:

(402) a. I'm not coming out until the floor is swept clean.

b. Drive off as soon as the lorry is loaded full.

(403) a. I'm not coming out until the crumbs are swept up.

b. Drive off as soon as the lolly is loaded on the lorry.

(404) a. *Get yourself a new broom if the bristles are swept off that one.

b. *Go to the chiropractor if your back is loaded sore.

---

[36] "**lol•ly** ... *Br slang dated* money." CIDE: 837.

- The verbs can appear in an eventive passive with or without an RE if the object refers to the location (405), but only with an RE when the object refers to the locatum (406). This is not altogether surprising, since it can also only appear in active expressions with the object referring to the locatum when there is an RE (408)[37]. Neither verb can appear in eventive passives with non-selected objects in the absence of an RE; strangely LOAD cannot do so even when the RE is present ((407)b).

(405) a. I'm not coming out until the floor has been swept (clean).
b. Drive off as soon as the lorry has been loaded (full).
(406) a. I'm not coming out until the crumbs have been swept *(up).
b. Drive off as soon as the lolly has been loaded *(up/on the lorry).
(407) a. Get yourself a new broom if the bristles have been swept *(off that one).
b. *Go to the chiropractor if your back has been loaded (sore).
(408) a. Sooty swept the carpet/*the crumbs/*the bristles.
b. Laurie loaded the lorry/*the lolly/*his back.

The behaviour of these words with REs shows that both the locatum and the location are (lexical) semantic arguments of the verb. It further shows that the referent of the object (be it a locatum or a location) is construed as affected by the profiled event. This is in accordance with observations (Dowty 1991, Rappaport and Levin 1988, above 4.1.2.6) that the referent of the object (when definite) is construed as wholly affected, and with the related fact that it is this argument that determines the aspectual properties of the utterance: ((409)a) implies ((409)b), but ((410)a) does not imply ((410)b).

(409) a. I am sweeping crumbs off the carpet
b. I have swept crumbs off the carpet.
(410) a. I am sweeping the crumbs off the carpet
b. I have swept the crumbs off the carpet.

[37] SWEEP does tolerate locatum-object constructions without an RE in some circumstances: *All morning Cathy cut the hedge and I swept the clippings.*

As noted, the locatum-object uses require the RE. This property is common to a number of constructions referring to caused motion: *Patty put the putty* *(*in the frame*). Verbs that have this property encode a result, which is the same as the location (see (403)); other caused motion verbs (including MOVE) do not encode a result, and for this reason they can be used without the RE.[38] Figure 102 shows Putting and Moving/c, the senses of PUT and (causative) MOVE respectively. Moving/c isa affecting, where the effect on the ee involves its following a path, Putting isa Moving/c, but also isa Making, since it has a result (see 3.1.4.2, Figure 48).

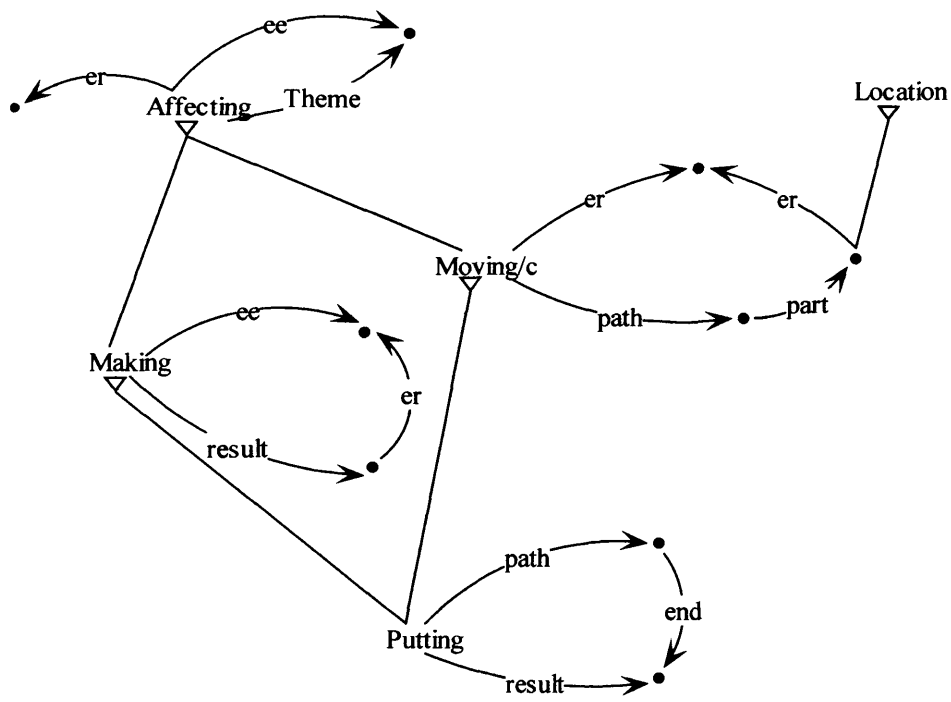

Figure 102 Putting and Moving.

[38] Some caused motion verbs that do encode a result can be used without the result being expressed as long as it can be derived from the context: *Iggy inserted a new cassette.*

Resultative verbs like INSERT have senses that isa Putting and non-resultative verbs like PUSH have senses that isa Moving. Verbs like SWEEP and LOAD can be used with a sense of each kind.

4.2.3 Summary (REs and Climbing)

The sharer-result construction given in 4.2.2.1 (repeated in Figure 103) provides the structure for all REs.

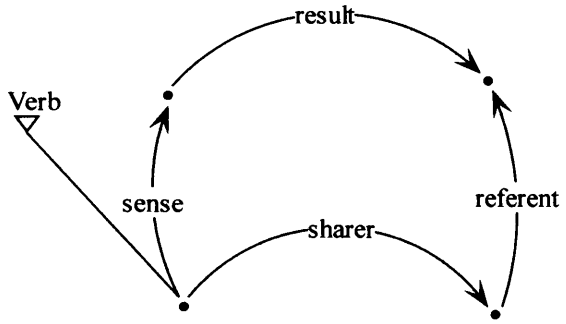

Figure 103 The resultative sharer.

When the verb is a resultative one (has a result built into its lexical semantic structure), the RE refers to that lexical result. When the verb has a causative sense, and so the argument of the result state is the ee of the verb's sense, the result is predicated of the ee (the referent of the object):

(411) Gary ground the coffee to powder.

When the verb has an unaccusative sense, and so the argument of the result state is the er of the verb's sense, the result is predicated of the er (the referent of the subject):

(412) The river froze solid.

When the verb is not resultative, an RE can be used (under the right circumstances) to add a result to the composite semantic structure. Since the sharer-result construction specifies that the result is predicated of the ee of the verb's sense, where the verb's sense has a lexical ee, the RE is necessarily predicated of this argument:

(413) Smithy beat the metal flat.

When the verb has no lexical ee, the RE is able to introduce one of these to the composite semantic structure as well:

(414) Darcy drank the bar dry.

These are the three kinds of RE identified in the preceding sections. Their properties are determined by those of the resultative construction and those of the various verbs. Under this analysis the resultative construction as a lexical category has a family resemblance structure similar to that proposed for Climbing by Fillmore (1982). Climbing, Fillmore argues, involves a manner ('Clambering') and a path ('Upwards'). Either one of these components is sufficient to classify an event as climbing (*Clive climbed down the tree*, *The plane climbed to 10,000 feet*). The resultative construction is similar in that it has two properties (obeys the DOR, is selected by the verb), either (but not both) of which may be absent.

The resultative construction consists of two uses of the sharer relationship, in control and in ECM constructions. In the former, since the affected argument is a thematic associate of the verb's sense, the verb's own properties determine whether it is the referent of the subject or object (*grind the coffee to powder*; *freeze solid*); in the latter, since the affected argument is not a lexical associate of the verb's sense, it is selected by the resultative expression and must be the referent of an object[39] (*drink the bar dry*/**silly*; *drink yourself silly*/**dry*). Naturally, some verbs with sufficiently flexible lexical semantics (polysemous verbs) can appear with either kind of RE (*sweep the hall clean/the crumbs into a cupped hand/your team into the record books*).

The semantics of the various REs is structured by the aspectual mechanisms introduced in the first part of the chapter. Resultative expressions are necessarily (by definition) telic and there is a limited number of ways that a verb's sense can be (or be made) telic. Verbs that have telic senses participate in lexical (control) REs. Of these

[39] The ECM construction requires object-sharing perhaps because the verb exercises too much control over its subject to allow a merger of the two arguments. For the same reason only verbs that can appear without selected objects are compatible with an ECM resultative.

some consist of simple events that have a result (achievements, *cut an arm off*) and others consist of sets (or aggregates) of events with a combined result (accomplishments, *freeze the lake solid*). The same possibilities are open to non-lexical (ECM) REs (*sneeze the froth off the coffee*; *talk yourself into a job*).

5. Ambiguity and the 'Causative Alternation'

In the previous two chapters I have discussed words that appear to exhibit variable behaviour of one kind or another. In this chapter I attempt to regularise the treatment of variable behaviour by looking more closely at the phenomenon and at some mechanisms for handling it. In the second part of the chapter I look at a particular kind of variability: the causative alternation that relates examples like those in (415).

(415) a. I split my head right open.

b. My head split right open.

5.1 Ambiguity: classifying ambiguity; modelling ambiguity; a continuum

5.1.1 Classifying ambiguity

The term **ambiguity** is often used to refer to a situation where a particular word (or a particular word form, see below) has two or more alternative meanings (for example BANK: 'financial institution', 'geographical feature'). The sense I use here represents a much broader phenomenon that covers all cases of mismatch between different levels of linguistic structure. This sense subsumes formal variants (eg WHILE: {while}, {whilst}), synonyms (SHUT, CLOSED) and words with multiple valencies (415) as well as homonymy and polysemy (BANK; DOG: 'canine', 'male canine'). Before I narrow the view down again in the second part of this chapter (which deals with the case of the causative alternation) I provide a survey of the wider phenomenon, and of some approaches to it.

Ambiguity is a property of lexical items. A lexical item is easiest and most generally understood as an arbitrary (conventional) pairing of a meaning and a form (pronunciation/spelling). At its simplest, syntactic behaviour is determined by assigning the lexical item to a word class (defined according to syntactic or semantic principles). The rules of syntax then make reference to these word classes, defining the order they must follow in well formed sentences. However, this is not really enough, since many words make particular demands on the syntactic structures they appear in. DEVOUR must have an object, EAT may and DINE may not; RELY demands the preposition ON; WANT allows a noun direct object or a TO complement, whereas WISH permits only the latter. The specific syntactic requirements of lexical items can be

represented in various ways (smaller word classes, lists of complements or complement features, etc) but, however it is encoded, this information must be associated with a part of the lexical structure. This means that a lexical item must have (at least) three poles: one that is the locus of information about its morphology, one for its syntactic properties and one for its meaning (called in WG the **form**, **lexeme** and **sense** respectively, see above). If this is correct, then it should be possible in principle for any of these poles to be ambiguously connected to any of the others. This provides eight different kinds of lexical item, summarised in the table.

	a	b	c	d	e	f	g	h
sense	1	1	1	1	2	2	2	2
lexeme	1	1	2	2	1	1	2	2
form	1	2	1	2	1	2	1	2

Table 5. Eight kinds of lexical item.

The eight possible kinds of lexeme are differentiated by the linking between the poles. In the first kind, a single form is associated with a single lexeme (word class, valency...) and a single sense; in the second two alternative forms are associated with a single lexeme with a single sense; and so on. Examples can be found of each of these types as follows:

a. should need no exemplification, since it represents the 'normal' state of affairs. Truly unambiguous lexical items are hard to find, however. Perhaps 'logical' operators like NOT or technical terms like NOUN qualify (though even NOUN is ambiguous for some: 'noun/1'; 'noun/1 or pronoun').

b. might be called polymorphy (though see below), in that the lexeme is associated with more than one form. An example is WHILE/WHILST. Arguably, this is also the appropriate category for the treatment of I/ME.

c. represents what Pustejovsky and Boguraev (1996) (among others) call 'polymorphy'. I prefer the term **polyvalence**, since these examples involve a single form (morphology), associated with more than one lexeme (representing the valence). A good example may be BEGIN, where the same form, {begin}, can be used with three different valencies without any perceptible change in meaning (416)-(418).

(416) Becky began her run.

(417) Becky began running.

(418) Becky began to run.

d. is synonymy. Just as with polysemy/homonymy (below), this kind of ambiguity may be arbitrary (eg FAST, QUICK) or motivated (eg EXPLODE, EXPLOSION).

e. represents what is traditionally termed 'ambiguity'. This sort of ambiguity is generally separated into **polysemy** (eg DOG: 'canine', 'male canine') where there is an obvious relationship between the two senses and **homonymy** (eg BANK: 'earth feature', BANK: 'financial institution') where there is not. This distinction is discussed below.

f. represents the relationship between inflectional variants, where a regular variation in form corresponds to an equally regular variation in meaning for a given lexeme. In the case of ONE, the variation in meaning and in form are unrelated. ONE has two possible senses ('someone' and '1') and two possible pronunciations (/wʌn/, /wɒn/).

g. is, like e., also often called ambiguity. The difference is that in this case the lexemes are separate too. Again these lexical items can be separated into polysemous cases (eg POCKET/n, POCKET/v) where there is a relationship between the two meanings, and homonymous ones (eg SHIFT/v: 'move', SHIFT/n: 'shirt') where there is not. In the examples I give here, the lexemes are clearly different, since they are of different word classes; below I argue for such an analysis in cases where the separation of the lexemes is not so clear cut.

h., like a., represents the 'normal' state of affairs: unrelated unambiguous lexical items. However, it is also possible for the lexical items to be related to each other, by some derivation relation, as in the case of POSSIBLE and IMPOSSIBLE or BREAK and BROKEN/adj.

The discussion above summarises the possible kinds of ambiguity. They are not all equally common, though all seem to be represented, and only a few correspond to what is traditionally meant by ambiguity. Some of these possibilities will be considered later for use in the analysis of the causative/unaccusative alternation.

5.1.2 Modelling ambiguity

In exemplifying the possibilities I have made a distinction between 'coincidental' ambiguities, where the two meanings, lexemes or forms are not related (except in as much as they share a form, lexeme or meaning) and 'motivated' ambiguities, where they are connected by some semantic, lexical or formal relationship. This distinction corresponds (as I note above) to the traditional distinction between homonymy and polysemy, also called contrastive and complementary ambiguity respectively (Weinreich 1964). Some writers propose a more sophisticated division however.

For example, Pustejovsky and Boguraev (1996) recognise both contrastive and complementary ambiguity (which they treat as an example of 'logical polysemy', where the lexical item is underspecified rather than ambiguous and the alternative form, valency or meaning derives from the context; I return to this question), but propose an additional possibility they call **sense extension** (ibid: 6), which is a productive form of polysemy, where a separate and related sense is created by a (more or less) productive lexical rule. A good example is the use of a mass noun to refer to a specific (countable) portion: *a beer*, *a coffee*, etc. This pattern is quite general but it is subject to some limitations: *a stilton* and *a motor oil* refer to different things (a particular type or brand in each case). It may be possible to constrain some of these semi-productive extensions without stipulation in terms of the specific semantic structures that they affect.

As well as a typology of ambiguities we must have some means of assigning particular phenomena to the appropriate type (i.e. of deciding which kind of ambiguity is involved). Here I consider a set of models developed by Croft (1998a), and the arguments he puts forward regarding how the choice between different models can be made. Croft recognises four basic models, defined at different levels of generality. He argues that, while linguistic evidence can be used to rule out the application of the more general models to a particular phenomenon, it cannot be used to rule out the application of a more specific model, since there is no reason to suppose that linguistic information is represented at the most general level possible.

Croft's models are described in the introduction as 'points on a probable continuum' (ibid: 151) and Croft explicitly recognises some intermediate models that share properties of more than one basic model. In 5.1.3 I show that the nature of that continuum becomes clear when the structural possibilities are represented in the WG

framework. I also show that the linguistic models can be divided according to three identifiable structural features: formal relatedness, productivity and motivation.

The models apply to two kinds of ambiguity. The 'simple' models are representations of cases where the same form has separate uses, as in the case of DOG. The 'complex' models represent cases of different, but related forms with different uses. Croft's examples of complex cases are: *pro'duce/'produce*, *sing/singer*, *write/write down* and *hand me it/hand it to me* (1998a:154). Note that these examples include (at least) two of the kinds I identified above, because of differences between the WG framework and that used by Croft, as explained here.

In Cognitive Grammar (CG) (see Langacker 1991), the framework Croft uses, lexical items consist of pairings of a **form** and a **use** in a **lexical unit**. The form corresponds to the form and elements of the lexeme in the WG analysis. The first two quoted examples clearly involve different forms, but they also must involve different lexemes in WG since they are of different word classes. The second two involve a single form and, arguably, separate lexemes. The verb in *hand me it* has an indirect and a direct object, whereas that in *hand it to me* has a direct object and a complement. This difference is most straightforwardly represented by giving each valency to a different lexeme, each a subcase of HAND/v, which share the same sense. Then the ambiguity is polyvalence (c. above).[40] In CG, however, examples like this are polysemous, since the two constructions have different meanings, so that the relevant form has two possible interpretations, each of which entails a different syntactic structure. In this way CG **use** corresponds to the **sense** (and elements of the **lexeme**) of the WG analysis.

The models are arranged in the other dimension along a continuum which extends from the specific to the general. That is, some linguistic representations are specific to particular symbolic units, while others apply to more general categories. A significant part of his argument is that 'grammatical and semantic idiosyncrasies are evidence for excluding the more general models' (Croft 1998a: 151). To use a very simple morphological example, the fact that the plural form of MOUSE is {mice} can

[40] In chapter 1 I argue for an analysis of the indirect object relationship as a construction separate from the lexical entry of its parent. This allows the two uses of HAND to share a single lexeme, as in e. above (polysemy).

only be represented at the level of the individual unit, while regular plurals may be represented at a more general level. So, for any given example of ambiguity, at least one of the models must apply. Close analysis of the data can supply evidence for excluding the more general models in each case. However, Croft argues that the converse is not necessarily true: 'grammatical and semantic generality is not a priori evidence for excluding the more specific models' (ibid). Croft's models are as follows:

The independent entries (homonymy) model. The classic case of homonymy is that of BANK. Here, the same form has two unrelated meanings. Croft argues that this requires two separate entrenched (lexical) representations. In this model, formal identity (or relatedness for the complex model) is, synchronically at least, purely accidental. The two symbolic units are connected only in as much as they share a form (or in as much as their forms are related). Idioms provide good examples for this model. No semantic generalities connect the meaning of KICK with that of *kick* in *kick the bucket* that do not also apply to the semantics of a wide variety of other verbs, so the two must have independent entries.

The polysemy model. The polysemy model differs from homonymy in as much as there is a semantic relationship between the two uses. It is this semantic relationship that motivates the identity of form. In the case of the complex polysemy model, the semantic relationship corresponds to a formal (lexical) relationship between the two forms. This formal relationship is therefore itself symbolic, as it corresponds to a part of conceptual structure.

DOG provides a good example for the simple polysemy model: it has two meanings, Canine and Male-canine, which are closely related semantically (one is a subset of the other). This relationship, however, is not general even to all animal types. In the case of COW, the opposite situation holds: COW refers to the concepts Bovine and Female-bovine.

An example of a complex polysemy model might be IN- prefixing. There is a regular formal relationship between a word and its 'IN-form', which includes some regular spelling and pronunciation changes (INACCESSIBLE, IMPOSSIBLE, IRREGULAR, ILLEGIBLE), and a corresponding semantic relationship between the senses of the two forms ('negation or privation' OED). However, both forms (more importantly the 'IN-forms') must be represented separately because not all adjectives have an 'IN-form'

(*INAVAILABLE). The rule is not productive so the relationship must be represented lexically for each example.

The derivational model. The derivational model differs from polysemy in that the relationship between the two linguistic structures is productive. In this model there is only one independent (entrenched) unit. The other is derived from the first by a language-specific rule. The simple derivational model represents a semantic relationship between two classes of uses having the same form. For example, in a process called 'animal grinding' by Pustejovsky and Boguraev (1996: 3-4), the names of fish (including the noun FISH itself) can also be used to refer to the flesh of the fish:

(419) a. The fish/shark/haddock swam under the boat.
b. I ordered the fish/shark/haddock.

Since this applies to all fish (in fact, with only a few exceptions, it applies to all meat-bearing animals; Copestake and Briscoe (1996: 37) quote an example from the LOB corpus where MOLE is used in this way), it could be argued that only one symbolic relationship need be recognised in the lexicon: the relationship between a class of animals and their meat (flesh which is eaten). Under this analysis, the polysemy is a property of a more general category.

Copestake and Briscoe (ibid) analyse this as a case of sense extension. The mass use is produced, they argue, by a lexical rule, apparently applying to all (edible) animals. This productive rule is blocked by PORK and BEEF from applying in the case of PIG and COW, though they do quote an example of each of these count nouns in mass usages (ibid: 38).

The complex derivational model represents a regular symbolic relationship. Two forms are related in a regular way and the formal relationship corresponds regularly to a semantic relationship. The symbolic relationship is productive, for Pustejovsky and Boguraev **coercive**, so that, again, only one of the form/meaning pairs need be entrenched. The recipient indirect object provides a good example of this model (see 1.2.3.3). As noted above, all verbs of transfer can have an indirect object referring to the goal:

(420) I sent/posted/faxed/emailed him the news.

Since this applies to any verb of transfer as soon as it becomes available, it must be a productive rule. In fact, it appears to apply even to nonce words where no independent representation is possible (*I carshaltoned him the news*), forcing them to be interpreted as verbs of transfer. It can also be used with verbs that are not lexically verbs of transfer, again forcing them to be so construed (*Archie waggled Benjy the news with his ears*).

Croft suggests, however, that the representation of the double object construction is nevertheless entrenched (as in the polysemy model) for the more conventional examples (1998a: 164). It is part of his claim that representation can be at more than one level of generality and it does not seem unreasonable in this case. The resultative construction, like the indirect object construction, is defined in part by those lexical items that select it but it also has a more general lexical representation of its own that determines its behaviour when used alongside lexical items that do not select it (Tomasello 1998a: xvii-xviii, and see 4.2.2.3).

The claim that more specific representations can coexist with productive patterns makes sense from the point of view of language learning. Language learners must hear, and lexicalise, at least two verbs used with indirect objects in order to extract the relevant generalisation. The lexical representations of these verbs, including the information that they may be used with indirect objects, are presumably not forgotten when the generalisation is extracted, though they may decay through lack of exposure. Other examples of learning classes must work in the same way: we observe of the first people we encounter that they have two arms, hair, faces etc and eventually assign these properties to a class, but this doesn't mean that we have to consider the properties of humans in general to ascertain how many arms our mothers have.

The pragmatic model. The simple pragmatic model involves a single, monosemous, symbolic unit, pairing a single form with a single use. This use can be extended in a number of ways, according to general (therefore universal) cognitive principles. It might be argued that the use of a word referring to an institution to refer to the building that houses it (*The bank is next to the school*) follows from pragmatic

principles. Of course, if that were so, this ambiguity would be found in all the world's languages.

The complex pragmatic model involves two symbolic units, both monosemous. The two forms combine according to the relevant formal principles but the combination of the two uses is interpreted according to general cognitive principles. For example, the difference between *eat cheese* and *eat soup* might be said to be predictable from the properties of eating and those of cheese and soup and not on the basis of the linguistic properties of the elements involved. This position is more plausible the more different world languages are found to use the same verb for the consumption of both cheese and soup. After a small survey, I can report that Chinese, Dutch, Finnish, French, German, Greek, Spanish and Turkish speakers prefer the translation equivalent of *eat soup* over that of *drink soup*, though many speakers of all languages can accept the latter to describe drinking soup out of a cup. This latter fact particularly supports the view that this involves a pragmatic model.

The pragmatic model subsumes some of Pustejovsky and Boguraev's cases of complementary ambiguity (the rest belonging to the derivational model). The interpretation of the adjective in *a fast typist*, *a fast car* and *a fast waltz* is determined by what we know about typists, cars and waltzing respectively (1996b: 5). This cannot be part of the lexical semantic structure, since, as Copestake and Briscoe (1996: 33) point out, the default interpretations can be overridden:

(421) The skiing race was won by the fast typist, who beat the slow accountant by 10 seconds.

The pragmatic model requires that the variability be common to all languages. Croft (1998a) gives the example of English *water tower* as an extended use of TOWER that cannot be assigned to the pragmatic model, since water towers are called *chateaux d'eau* ('water castles') in French. This seems reasonable in this case (especially since the alternative forms **water castle* and **tour d'eau* are not found), but I have some reservations about the principle because moving between two languages entails moving between two complex systems of assumptions (including the very rules of the languages!). If, for example Russian speakers prefer (VI)PEETJ ('drink') to (S)YESTJ

('eat') as the appropriate verb referring to the consumption of soup, this would not necessarily amount to evidence for excluding the variability *eat soup/eat cheese* from the pragmatic model, until it has been established that Russians typically eat soup in the same way as the English: it may be (though it isn't) that Russians traditionally take very thin soup, which they drink out of cups.

5.1.3 Croft's models in the WG framework: a continuum.

In this section I look at how Croft's models can be represented in the WG framework. I place the models on a continuum, and identify the features that distinguish between them.

The simple and complex models are distinguished by the number of forms: a simple model involves a single form and a complex model involves two related forms. As noted above, CG's form corresponds to both form and lexeme in WG. This difference has important consequences, that are explored below, but for now it will suffice to say that the simple models involve single lexemes and the complex models pairs of related lexemes.

- The homonymy, or independent entries models involve a lexeme, or pair of lexemes, associated with two semantically unrelated senses.
- The polysemy models involve a lexeme, or pair of lexemes, associated with two semantically related senses.
- In the derivation models, this semantic relationship is a regular one. That is, it applies equally to a number of lexical items, by virtue of semantic features associated with their senses. Regularity is represented in WG by assigning the relevant property to a class of elements so the derivation models establish two semantic classes, defined by the relationship between them. Evidently, an element can belong to more than one such class, to the extent that it possesses more than one of the qualifying features (or sets of features). For example the verb PRODUCE participates in both stress-shifting nominalisation and in -ER nominalisation.
- The pragmatic model in WG calls for a single lexical item whose structure is sufficiently general to permit it to appear in different structures, the specifics of meaning or valency being filled in by the context.

I now turn to a closer investigation of the three distinguishing features identified above. The first of these is the identity of lexeme that distinguishes simple from complex models. As can be seen from the examples of complex models given so far, a number of syntactic properties distinguish the two lexemes and a number of common syntactic properties connect them. PRODUCE/v and PRODUCE/n share the same spelling but differ as to pronunciation and word class. SING and SINGER additionally differ as to spelling. WRITE and WRITE/down share the same form and word class but select different dependents. POSSIBLE and IMPOSSIBLE differ (morpho-syntactically) only in their form. So in the complex models, the two syntactic lexemes can be related in any one of a number of ways. In the light of this, the simple models can be considered as a special case where the two lexemes are related by identity.

The second distinguishing feature identified above is that of semantic relatedness, which distinguishes homonymy from polysemy. In WG, as outlined above, semantic information (in fact, all linguistic information), is represented in a network. In a network, all elements are, to some extent, related to each other, so this cannot be considered a binary feature. Evidently, though, something interesting can be said about the closeness of the relationship in some cases. For example, the two senses associated with DOG are related by a single isa relationship (Figure 104), whereas two of the senses associated with BANK are relatively distantly related (Figure 105).

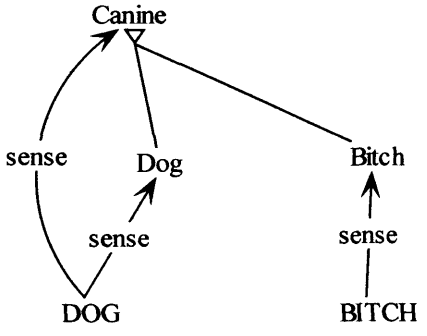

Figure 104 DOG.

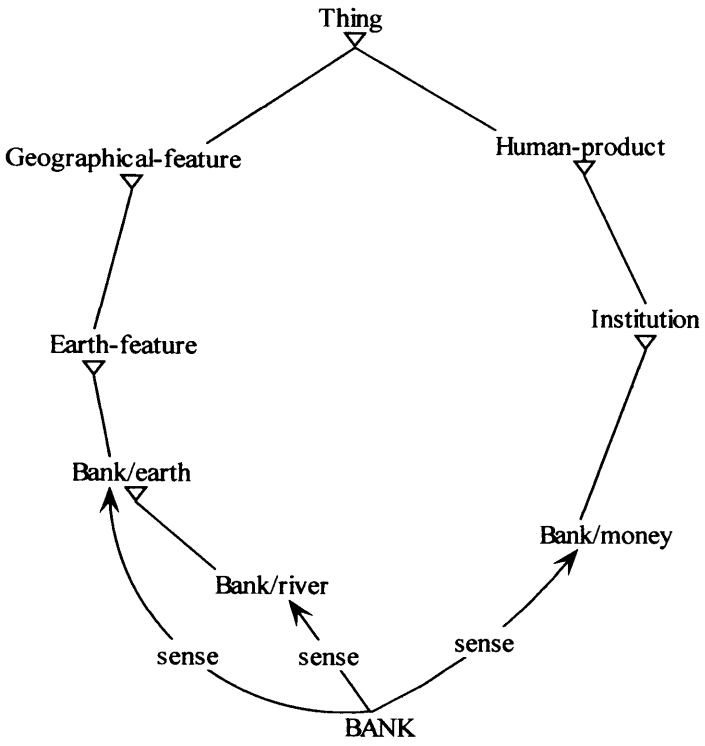

Figure 105 BANK.

The fact that the relationship between the two senses of DOG is so close can be said to be significant: it motivates the polysemy. The relationship between the two senses of BANK, being much more distant, is more likely to be accidental. However, it is not possible to give exact specification of the degree of closeness that is required to motivate a given example. All that is necessary in order to establish that two concepts are closely related in this way is that the individual speaker be (explicitly) aware of the relationship.

Polysemy is distinguished from derivation by the fact that in the latter case the semantic relationship applies to a class of concepts. The size of this class varies between cases. Animal grinding seems to apply regularly only to creatures whose flesh we are used to eating (though see below (423)). The recipient indirect object construction applies to all verbs of transfer (except those that already have lexically specified linking, e.g. BESTOW, PRESENT). Levin (1993: 83) identifies a regular alternation involving only two verbs, the 'Source Subject Alternation':

(422) a. The middle class will benefit/profit from the new tax laws.

b. The new tax laws will benefit/profit the middle class.

Croft's models of ambiguity, then, can be taken as limiting cases defined by interacting scalar criteria. The table gives the distribution of the simple and complex homonymy, polysemy and derivation models.

	unmotivated	motivated	
	unproductive		productive
single lexeme	**simple homonymy**	**simple polysemy**	**simple derivation**
two lexemes	**complex homonymy**	**complex polysemy**	**complex derivation**

Table 6. Croft's models of ambiguity.

Figure 104 and Figure 105 show how WG models simple homonymy and polysemy. In both cases, a single lexeme is associated with two separate senses (which may or may not be related). Complex homonymy and polysemy are similar, though in these cases the syntactic pole consists of two more or less related lexemes. Croft's models all involve small changes in the form of the word or its valency. Pustejovsky and Bouillon's examples of polymorphy involve changes in valency, which preserve the form. However, there are examples where the lexemes are not formally related at all; for example, the relationships between the senses of HORSE and STALLION is just the same as that between the two senses of DOG, yet their forms are unrelated.

Derivational polysemy can be modelled quite simply in WG. Since no distinction is made between lexical and grammatical structures, semantic structures can contain relationships that hold between classes of semantic elements. The relationship between the class of meat-bearing animals and their flesh is shown in Figure 106.

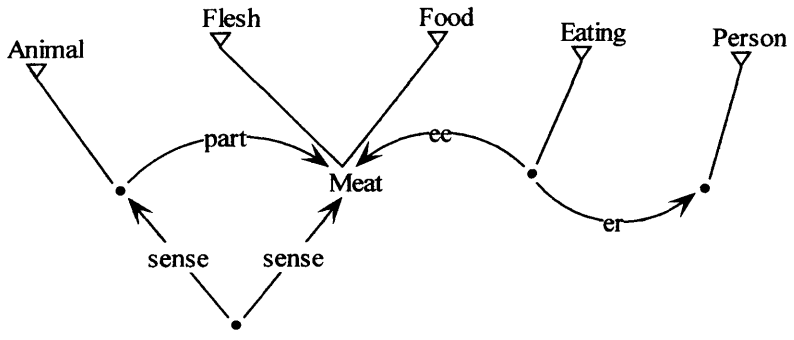

Figure 106 MEAT.

The figure shows a class of polysemous lexemes (not named in the diagram). The alternative senses correspond to the animal and its edible flesh. Figure 106 amounts to a schematic representation of the 'animal grinding' relationship by which any word that refers to an animal can be used to refer to its edible flesh. This generalisation may be a special case of the pattern that allows lexically countable nouns to be used to refer to the substance of the lexical sense (423), though it does need to be represented independently in the grammar because it is more limited in application. It will also, of course, be overridden in the case of pairs like COW and BEEF, PIG and PORK etc.

(423) There was fish/aubergine/pig/balloon all over the floor.

Complex derivational polysemy involves two more or less related classes of word. {en} addition applies to a wide range of adjectives. The schematic representation of the syntactic pole involves a relationship between two lexemes (an adjective and a verb) whose bases differ only with regard to the {en}. The senses of these lexemes are a state and an action whose result is that state.

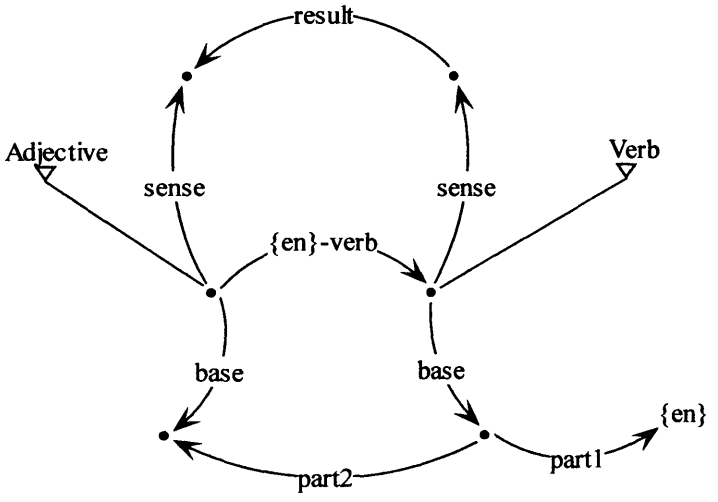

Figure 107 {en}-verb.

The schematic representations of these two productive relationships constitute the lexical rules that license the polysemy. I show below that this structural, declarative, account is only one of the ways of analysing these phenomena. Levin and

Rappaport's (1995) account, which appears in the next section, is a procedural one, that makes use of word formation rules that operate on lexical structures.

The distinction between procedural and declarative analyses of ambiguity is one of two factors that will be significant in the treatment of the causative alternation. The second concerns the approach to polyvalence. Polyvalent elements are lexical items whose syntactic pole has variable properties (word class or valency). In WG, the lexeme represents the syntactic pole of a lexical entry and carries the properties of form, word class and valency (among others). This implies that any case of polyvalence should involve two separate lexemes. However, I have already argued against this implication for certain examples of variable valency. In discussing the beneficiary indirect object above (1.2.3.3), I claimed that it should be analysed as a construction applicable to any verb whose semantics is suitable. It is unreasonable to propose, for example, separate lexemes for uses of BAKE with and without an indirect object. Goldberg applies a similar argument to caused motion constructions (424), beneficiary indirect objects (425) and resultative constructions (426) (1995: 9-10).

(424) He sneezed the napkin off the table.
(425) She baked him a cake.
(426) I can talk all the beer from here to Middlesbrough sour in the barrel.

This principle, that syntactic structures (constructions) may themselves be meaningful and that some cases of polyvalence can be analysed as an example of the pragmatic model (or in Pustejovsky and Boguraev's terms as a case of coercion), once established, raises the question whether it is ever necessary or desirable to recognise two distinct lexemes in cases of variable valency. As I argued above, the separation of lexemes may be considered a matter of degree. Evidently TALK and SPEAK are different lexemes: they differ as to form, valency and meaning. Both are members of the word class Verb but, aside from the similarities in their meanings, they are otherwise unrelated. The case of the verb in (426), however, is different. The verb in (426) and that in *I can talk* are both examples of the lexeme TALK. They have different valencies but this is a property of the construction, not the lexeme.

These two cases represent the extremes of polymorphy. SPRAY provides a possible example of an intermediate case (this pattern is discussed above: 3.1.4.3, 4.1.2.6).

(427) a. Jackson sprayed paint on the wall.

b. Jackson sprayed the wall with paint.

The verbs in (427) have different valencies. They also have different meanings. In (427)a, the verb refers to an act of Putting (caused motion); in (427)b it refers to an act of Covering. The difference in valency can be explained in terms of the difference in meaning (as it was in the case of (426)): in (427)a, the ee is the paint; in (427)b it is the wall. However, the patterns in (427) are established in a way that that in (426) is not. (426) represents a novel use of an entrenched form whereas (427)a,b represent two separate entrenched forms. We can represent this in the grammar by means of two sub-lexemes of SPRAY, each with its own valency. Notice that there is little hard evidence for this analytical decision, apart from the circumstantial evidence given in 4.2.2.5. To establish the presence of two lexemes we must show that the different uses differ as to some further independent property, which I have not done.

This possibility (representing polymorphy in terms of sub-lexemes) exists also in cases where a lexeme can appear with two forms. WG routinely treats inflectional variants (eg AM, WAS) as examples of the same lexeme. A similar analysis could be applied to the nouns BIKE and CYCLE for example. These two words differ as to their form but have the same meaning and word class. Here, though, there is clear evidence that they must be recognised as separate lexemes, at least in my mind, since CYCLE has a zero-related verb while BIKE does not.

This issue will be borne in mind in the analyses that follow. In some cases it will be necessary to recognise two lexemes (or distinct sub-lexemes), rather than just one. In some cases, while it may not be necessary, it will nevertheless be desirable.

In the following section I turn to the properties of a specific case of ambiguity, the causative alternation. I try to present the relevant data in as neutral a way as possible. Further sections outline possible analyses.

5.2 The causative alternation

5.2.1 Causative and unaccusative constructions: ambiguity; verbs in causative constructions; verbs in unaccusative constructions; variable behaviour verbs

5.2.1.1 Multiple valency as a kind of ambiguity

In the remainder of this chapter I develop an account in WG of those English verbs, like BREAK, that appear in causative and unaccusative constructions:

(428) The burglars broke a window.
(429) The window broke.

These verbs have been quite extensively studied in various frameworks (Levin gives 88 references (1993: 27)), particularly because they exhibit variable syntactic valency. In any framework where syntactic valency is related directly to lexical semantic structure, such variable valencies are bound to receive considerable attention.

The examples show that the verb form {break} can be used with two different valencies. Furthermore, the meanings of the two examples are different (the second is an entailment of the first, but not vice versa). According to the definition given above (5.1.1), this pattern must be considered a kind of ambiguity. Specifically it is an example of ambiguity as discussed above under (e) or (g) (ie **polysemy** or **lexical relation**). I assess these two possibilities in the WG analysis below (5.2.3) and conclude that the pattern can be analysed as polysemy (ie it involves just one lexeme in each case). I go on to consider the relationship between the two senses, asking specifically whether it is a simple case of polysemy, or if there is a productive derivational relationship between the two, as proposed for example in Levin and Rappaport Hovav (1995); I advance evidence against Levin and Rappaport Hovav's analysis and I conclude that the pattern can be analysed most simply as a case of motivated polysemy.

I begin by exploring the properties of the alternation, including the range of verbs affected and the linking and aspectual properties of the two constructions. The pattern in (428) and (429) is especially significant in a theory of lexical semantics since it involves a change of syntactic valency, but also simply because it applies to so many verbs. Levin identifies 313 verbs that participate in some kind of causative

alternation (1993: 26-32) (Levin's index contains 3107 verbs so the alternating verbs represent slightly more than a tenth). Furthermore, the alternating verbs are themselves more common than the non-alternating ones: 20 of the 100 most common (non-auxiliary) verbs in the LOB corpus alternate (all other things being equal we should expect only 10 of the first 100 to alternate). The productivity/systematicity of the ambiguity of verbs like BREAK is a serious question for lexical semantics and has important consequences for the way we think about the organisation of the lexicon. I argue below that the sheer number of verbs that participate in the alternation represents an important reason for preferring the polysemy analysis.

In the following sections, I consider the two constructions separately in turn, since they have important independent, as well as interdependent, features.

5.2.1.2 Causative constructions

(428) is clearly a transitive construction. The verb has a subject, *the* (*burglars*), and an object, *a* (*window*). The syntactic properties of the first dependent are just those of subjects (see 1.2.4.3):

- the dependent is obligatory with tensed verbs (430);
- further when the verb is tensed, pronouns that have a marked form for subjects appear in that form in this position, and the verb (when present) inflects to agree with the dependent (431);
- the dependent is (in some Englishes) obligatorily construed as the subject of a (preceding) subjectless adverbial participle (432);
- it is this dependent that is shared when the parent is a sharer (xcomplement/xadjunct) (433);
- it is obligatory in relative clauses (434);
- and it appears (normally) before the verb (435).

(430) *Broke a window.

(431) He/*him always break*(s) the window.

(432) Swinging his axe wildly, he broke the gate to pieces.

(433) We saw them break the window.

(434) The burglars *(who) broke the window were FBI agents.
(435) *A window broke the burglars.

Semantically the referent of the subject fills an agent role. The details of the semantic relationship are explored below.

The syntactic properties of the second dependent are just those of an object (see 1.2.4.2, Hudson 1992):

- the dependent appears as the subject of the verb in passive constructions (436);
- it can be extracted (437);
- it can appear before or after a particle (unless a pronoun) (438);
- it cannot be separated from the verb by any other adverbial element, except under 'heavy NP shift' (439);
- it does not appear in marked subjective case (440);
- and it can be used alongside an indirect object (without it the indirect object may not be used) (441).
- Finally, just as one would expect of an object relationship, this dependency supports many idiomatic expressions (*break wind, break bread, ...*).

(436) The window was broken.
(437) The window they broke, the door they left alone.
(438) We broke the door down/down the door/it down/*down it.
(439) We broke quickly all the windows *(that remained after the previous day's punishing bombardment).
(440) We broke them/*they.
(441) I'm making an omelette, break me *(some eggs).

The semantic properties of the construction are centred on a causing event (hence the term **causative** construction). They profile a process affecting one participant (the referent of the object) caused by an action of another (the referent of the subject). In this way the semantic roles of the subject and object fit very well into the schemata discussed above (3.1.4.3). The causer is a typical agent: often human,

volitionally involved (and therefore sentient), controlling the event and having independent existence. The other participant is a typical patient: often inanimate, having no independent existence and undergoing a process or change of state with observable effects.

Some verbs in causative constructions profile a change of state in the patient. Constructions with these verbs are telic (see 4.1.1):

(442) The burglars broke the window in/*for ten minutes.

Others profile an ongoing process affecting the patient. Constructions with these verbs are generally not telic:

(443) The stevedores shoved the charabanc *in/for ten minutes.

Telic causative verbs permit middles (see 1.1.3, 1.2.5, Levin 1993: 25-26), whereas processive ones do not:

(444) Toughened glass doesn't just break.
(445) *That charabanc won't just shove.

Verbs in the causative construction permit resultative expressions predicated of the object, as in (446) (see 4.2.2).

(446) a. The burglars broke the vase to bits.
b. The stevedores shoved the charabanc into the shed.

As discussed in the previous chapter, resultative expressions with telic causatives are lexically constrained by the verb (447)a and necessarily predicated of a lexically selected object (447)b, but resultative expressions with non-telic causatives can be predicated of non-selected objects (448)b, though when they are used with a selected object they are nevertheless still semantically controlled (448)a.

(447) a. The burglars broke the vase to bits/*leaky/*useless.

b. *The burglars broke the room draughty/themselves into jail.

(448) a. The stevedores shoved the charabanc into the shed/*sheltered.

b. The stevedores shoved the shed full of charabancs/themselves out of a job.

A resultative expression has (can have) the effect of making the construction telic. In this case, where the object is the semantically selected one, the middle construction becomes possible (449). Levin notes that many processive verbs permit middles only in the presence of a resultative expression (450) (1993: 26).

(449) The charabanc won't just shove into the shed.

(450) This metal beats *(flat) easily.

5.2.1.3 Unaccusative constructions

(429) The window broke.

(429) (repeated here) is intransitive. The single dependent shares the properties of subjects discussed earlier:

(451) *Broke.

(452) They/*them always break(*s).

(453) Being struck by an axe, the gate broke instantly into pieces.

(454) We saw the window break.

(455) The window *(that) broke was mullioned.

(456) *Broke the window.

I call these constructions unaccusative after Perlmutter (1978).[41] Just as with the causative construction, unaccusatives are identified by their semantics. An unaccusative profiles either a change of state or process undergone by the referent or a

[41] A note on terminology: the terms **unaccusative** and **ergative** are more or less synonymous. Levin (1993) uses the term **inchoative** for the intransitive poles of the causative alternation, though only some of them are in the strict sense inchoative.

state predicated of it. Here I have separated unaccusatives into three classes according to their aspectual properties and I consider the behaviour of each class in turn.

The construction in (429) represents the first class. It is, like the corresponding causative, telic (457). It is also clearly (and in fact necessarily) non-stative (458).

(457) The window broke in/*for five minutes.
(458) The window is breaking.

These constructions, profiling a change of state like the causatives, also permit resultative adverbials, lexically selected and predicated, in this case, of the subject:

(459) The vase broke to bits/*leaky/*useless.
(460) *The window broke the room draughty.

The referent of the subject in this construction is the patient of the profiled event, the participant undergoing the change of state. In many cases, the event is construed as being outside the control of the patient.

In languages where there is a choice of auxiliary in perfect constructions, unaccusatives are sometimes characterised by the use of the equivalent of BE, rather than HAVE. In German, for example, *gebrochen*, the past participle of BRECHEN ('break'), appears in unaccusative perfect constructions with SEIN ('be'); similarly in Dutch *gebroken* appears with ZIJN:

(461) Das Fenster ist gebrochen.
the window is broken
The window broke/has broken.
(462) De raam is gebroken.
the window is broken
The window broke/has broken.[42]

[42] These examples are both (syntactically) ambiguous, since Dutch and German freely permit the formation of adjectives from the past participles of change of state verbs. English permits this in some cases (*The window is broken*), but not all. This issue is discussed at length in Holmes (forthcoming).

The second type of unaccusative construction is exemplified in (463).

(463) Warren wobbled.

Unlike the preceding examples, the construction in (463) is not, by itself, telic (464). However, like the telic unaccusatives these are non-stative (465).

(464) Warren wobbled for/*in five minutes.
(465) Warren is wobbling.

Since they are not telic, they do not select a result adverbial. They do permit a direction adverbial, predicated of the subject (466), (468). This adverbial may itself be telic (467), (469).

(466) Warren wobbled around the garden for/*in five minutes.
(467) Warren wobbled into the water in/*for five minutes.
(468) Sally swung through the air for/*in five minutes.
(469) The door swung shut in/*for five minutes.[43]

This possibility is especially relevant in the case of verbs like WALK, SWIM, MARCH, that profile typically locomotive actions (see 3.2.3, 4.1.2.4). These, like WOBBLE, are not by themselves telic (*Sally swam for/*in five minutes*). Even when telic, unaccusatives of this type profile a process affecting the referent of the subject. This process involves a change of shape, posture or orientation (CURL, FURL, STRAIGHTEN, TURN, ...) or an alternation between shapes, postures or orientations (WIGGLE, WOBBLE, FLAP, SPIN, ROLL, ...). The profiled process/event may be controlled by the referent of the subject, but it need not be:

[43] *Warren wobbled into the water for five minutes* and *The door swung shut for five minutes* are, in fact, both acceptable, on the interpretation where the result state (Warren being in the water, the door being shut) lasts for five minutes. This possibility is discussed at greater length elsewhere (3.2.2.3, 4.1.1, 4.1.2).

(470) Wally wobbled determinedly for hours, trying to inch his chair closer to the edge of the table.

(471) Wally wobbled dangerously when Sally shoved at the table, but she couldn't make him fall off.

In German, the construction combines with HABEN in perfects, except in the case of the manner of motion verbs (472), (473). In Dutch, all verbs in the non-telic unaccusative construction combine with HEBBEN but unaccusative constructions with telic direction adverbials combine with ZIJN (474), (475).

(472) Willy hat gewankt.
Willy has wobbled

(473) Willy ist gelaufen.
Willy is walked

(474) Willy heeft gewiebeld/gelopen.
Willy has wobbled/walked

(475) Willy is naar de stad gewiebeld/gelopen.
Willy is to the town wobbled/walked

Apparently auxiliary selection is determined by the verb in German and by the construction in Dutch. Notice, however, that while manner of motion verbs in German combine with SEIN whether in a telic construction or not, the other process verbs can combine with SEIN when there is a telic direction adverbial:

(476) Willy ist nach Wilhelmshaven gewankt.
Willy is to Wilhelmshaven wobbled

Interestingly, Wahrig (1982: 4104) lists WANKEN as ambiguous: "unsicher stehen oder gehen" ('stand or walk unsteadily'), which implies that auxiliary selection is in these cases determined by the construction, whereas Collins (1980: 741) gives two separate lemmas with different auxiliary selection properties, translating the second (with SEIN) as "totter" (unambiguously a kind of walking), thus preserving the

assumption that verbs, rather than constructions, select auxiliaries in German. For a fuller discussion of motion verbs, in English as well as Dutch and German, see 3.2.

The third type of unaccusative I discuss here is exemplified in (477).

(477) Oxford lies on the Thames.

Perlmutter (1978) includes **stative** predicates (including adjectives) among the unaccusatives, since the states they profile are predicated of the subject, just like the changing or alternating states in the eventive unaccusative constructions. Since these constructions refer to states, they are clearly not telic (478); nor do they involve a change (479).

(478) Oxford lay on the Thames for/*in many centuries.
(479) *Oxford is lying on the Thames.

Again, since they are non-telic, these constructions do not permit resultative adverbials (selected or non-selected); they can appear in perfect constructions (*Oxford has lain on the Thames for centuries*), and in both Dutch and German the auxiliary is HEBBEN/HABEN, because ZIJN/SEIN requires the subject to refer to an affected participant (which means the verb must have a telic eventive meaning).

5.2.1.4 Verbs with causative and unaccusative uses

In this section I investigate the capabilities of verbs capable of appearing in unaccusative constructions (be they telic, dynamic but not telic, or stative) to appear in causative constructions and vice-versa. I show that this pattern is regular and systematic, in that it applies in the same way (subject to semantic constraints) to large numbers of verbs.

The three unaccusative constructions discussed above have in common the fact that they all involve a state, or states, predicated of the subject. However, they differ aspectually.

(480) The window cracked in/*for five minutes.

(481) The window is cracking.

(482) Benny wriggled for/*in five minutes.

(483) Benny is wriggling.

(484) Manchester lay in Cheshire for/*in many centuries.

(485) *Manchester is lying in Cheshire.

The aspectual differences between the three kinds of unaccusative can be seen in the above examples. The first type is telic (480) and dynamic (481); the second type is not telic (482), though it is nevertheless dynamic (483); the third type is not dynamic (485), and therefore cannot be telic (see also (484)).

A further property these constructions have in common (and the reason for their inclusion in this chapter) is that many of the verbs appearing in one of the unaccusative constructions can also be used in a corresponding causative construction. In this section I present the relevant data and show that verbs that appear in one or other of the unaccusative constructions can also appear in a causative construction to the extent that they can have an affective interpretation: verbs with telic unaccusative interpretations generally also have telic causative interpretations; verbs with processive unaccusative interpretations also have processive causative interpretations, to the extent that the process can be construed as controlled from without, and many (including those that exclude external control) have telic causative interpretations; verbs with stative unaccusative interpretations may have telic causative interpretations, to the extent that they may also have telic unaccusative (inchoative) interpretations.

The first class, the telic unaccusatives, are central in this respect. Almost all verbs permitting telic unaccusatives also permit causatives (some exceptions are identified below, 5.2.3.5). The relevant verbs profile telic events, often externally caused or at least compatible with external causation (this distinction is found in Levin and Rappaport Hovav (1995), as well as elsewhere, it is discussed in some detail in 5.2.3.5). Because they profile a change of state, these verbs fit very well into the frame of the unaccusative construction, with the affected entity as the referent of the subject. Because they profile a change of state, and to the extent that they allow for external causation, they fit very well into the frame of the causative construction, with the affected entity as the referent of the object and the causer as the referent of the subject.

The second class, the process unaccusatives, is rather different. These verbs profile processes undergone by the referent of the subject and are often ambiguous as to agency. Because of this ambiguity many of the verbs fit equally well into the unaccusative and unergative constructions. As I argue in 4.2.2, it is the unergative construction that allows unselected resultative adverbials predicated of a (reflexive) dummy object, as in (486) and (487). If that is correct, then (488) and (489) must also be based on unergative constructions.

(486) The audience laughed themselves sick.
(487) We drank ourselves silly.
(488) Sally swam herself fit.
(489) Tom Jones wiggled himself into the top ten.

In these examples, the subject refers to an agent, in volitional control of a process affecting them (except, arguably, in the case of laughing). However, the telic event (becoming sick, silly etc) is separate from the process (laughing, drinking etc). The obligatoriness of the reflexive in these examples signals that the affected entity and the referent of the subject are only coincidentally the same ((490) and (491) show similar constructions where the affected entity is not identified with the agent).

(490) They laughed him off the stage.
(491) We drank the bar dry.

Also suggestive is that all of the examples (486)-(489) would be translated with HEBBEN in Dutch, which means that at least in Dutch they must be unergative constructions:

(492) Het publiek heeft zich kapot gelachen.
the audience has [refl] broken laughed[pp]
(493) Wij hebben ons lam gedronken.
we have us lame drunk[pp]
(494) Sally heeft zichzelf fit gezwommen.

Sharon has herself fit swum[pp]

(495) Tom Jones heeft zichzelf in de top tien gewiebeld.

Tom Jones has himself in the top ten wiggled[pp]

(488) and (489) show unergative uses of the verbs SWIM and WIGGLE. They are appropriate in this construction since they profile a process that may be construed as being under internal (agentive) control. However, many of them, particularly those that can profile a change of position, also qualify for use in unaccusative constructions like those shown above ((464)-(469)). In many of these cases, the process may be further construed as being under external control, which means that many of the relevant verbs can also appear in causative constructions.

(496) Benny wiggled his toes.

(497) Benny wiggled the chair.

These examples are, in some ways, different from the causative constructions formed with lexically telic verbs. In (496), we see that WIGGLE may be used causatively, with the object referring to a (body) part of the wiggler. This example shows some similarities to the unergative constructions with WIGGLE discussed above. In fact, translating into German shows even more similarity, since an unergative construction must be used, the body part appearing as the complement of a preposition (*Walter wackelte **mit** den Zehen*). The construction in (497) is just like the atelic causative constructions discussed above; in both causative and unaccusative uses, the verb retains its aspectual structure, profiling a dynamic process (498), (499). Telic constructions are possible with transitive WIGGLE, the telicity deriving from a resultative adverbial (500).

(498) Benny wiggled for/*in five minutes.

(499) Benny wiggled the chair for/*in five minutes.

(500) Tom wiggled himself into the Top Ten/the chair useless in/*for a week.

Causative constructions with manner of motion verbs (501)-(503) are even more exceptional.

(501) She walked her fingers up his spine.
(502) Wally walked Stephanie to the station.
(503) Wally walked the wardrobe across the floor.

The causative construction implies agentive control and verbs profiling manners of motion may, as noted above, ascribe agentive control to the moving participant. Verbs whose profiles do not entail agency (eg ROLL, BOUNCE) present no problem in causative constructions, but those (like WALK) whose profiles do can only be used in causative constructions under special circumstances. (503) is not exceptional, in that the subject refers to a controlling agent and the object to an affected patient. In fact, wardrobes cannot be said to walk at all without outside help: ?!*The wardrobe walked across the floor*.

(502) is rather exceptional, as an example of a causative construction, in that the referent of the object retains some agentive control over the act of walking. It is unexceptional as a causative construction (and exceptional as a sentence made with WALK) in that the whole event (getting to the station by walking) is controlled by the referent of the subject, and not by the walker. In many cases, the causer must also be moving in the same manner (Wally cannot be said to have walked Stephanie to the station if he merely shows her on a map where it is, or lets down the tyres on her bicycle, nor even if he accompanies her on a bicycle, with her walking alongside and, in fact, if he walks and she cycles (or rides in her wheelchair), then he **can** be said to have walked her). Levin sees this as an important and defining difference between causatives made with manner of motion verbs and the telic causatives discussed above (1993: 31), though she notes that some cases permit the agent to remain stationary:

(504) The scientists ran the rats through the maze. (ibid)

A further special property of causatives made with manner of motion verbs is that the adverbial expression is often obligatory:

(505) Betty bounced the ball (down the wicket).
(506) Wally walked his stepmother *(to the station).
(507) Wesley walked the dog (round the block).

Causative expressions made with BOUNCE can be interpreted in one of two ways: the causer may be construed as simply causing the bouncer to bounce, or as causing it to move by bouncing (intransitive expressions with BOUNCE show the same ambiguity). However, with WALK, the first of these interpretations is (usually) ruled out, because the act of walking is by definition under the control of the walker. (506) must be construed as a telic event, whose result is the stepmother being at the station, with as agent the referent of the subject. For this reason the direction adverbial is obligatory, since without it the expression is not telic.

(507) shows that this constraint on the use of WALK in causative expressions can be overruled by convention. The adverbial may be left off in this example, since there exists a strong (cultural) framework in which walking the dog is a recognisably telic activity. The result is that the dog has been walked, even (euphemistically) that it has been taken outside and made to defecate. This event (the dog being given the opportunity to take a day's exercise, or to relieve itself), is typically construed as controlled by a human agent, hence the acceptability of (507) without the adverbial.

Finally (501) above shows that verbs profiling manners of motion can also be used in causative constructions with a body part in the affected role. It is not immediately clear that this construction differs significantly from those in (502) or (503).

So far I have discussed the eventive verbs associated with unaccusative constructions and their behaviour with respect to the causative construction. The third class, verbs profiling a state, also permit causative constructions under certain circumstances. The stative verbs of English can be separated into two broad classes, those profiling psychological states and those profiling states of existence (including

location/spatial configuration).[44] The verbs that are relevant here can be found among the latter group. They include Levin's "*exist* verbs" (1993: 249-250), which consist of a mixture of 'true' statives and processes, the "verbs of spatial configuration" (ibid: 255-256) and two small mixed classes, "*meander* verbs" and "verbs of contiguous location" (ibid: 256-257).

Some of these verbs profile lasting states. These are acceptable in simple present constructions (508)a but do not permit processive, or temporary state (508)b, inchoative (508)c or causative (508)d interpretations.

(508) a. Three powerful reasons exist for assuming this model of human cognition.

b. *No solution to this problem is currently existing.

c. *A solution suddenly existed.

d. *Einstein existed a solution.

Others profile states that can be construed as temporary, and so they additionally permit present progressive constructions referring to temporary states (509)b.

(509) a. A remarkable culture flourishes in this city.

b. Felicity is flourishing in Florence.

c. *Felicity suddenly flourished when she arrived in Florence.

d. *Florence flourished Felicity.

Still others focus on the process taking place at a location, and so receive a processive interpretation in progressive constructions (510)b.

(510) a. The maglev hovers between two electromagnets.

b. A dragonfly is hovering over the pond.

c. *The dragonfly suddenly hovered over the pond.

[44] Here I confine my attention to stative verbs. It should be noted, however, that English makes extensive use of adjectives to profile states. Properly speaking, these should be treated here since so many verbs in both (telic) unaccusative and causative expressions are related by derivation to adjectives.

d. *The engineers hovered the train between two magnets.

Others again allow inchoative interpretations, where the effect of the verb's profile (in the case of LOOM a sense of threat) is achieved by its argument beginning the relevant state or process (511)c.

(511) a. The mountain looms over the town.
b. A cloud is looming over the stadium.
c. A cloud suddenly loomed over the stadium.
d. *The ogre loomed his face over the parapet.

Finally, there are those that additionally permit causative uses (512)d. This is only possible for those that have inchoative unaccusative interpretations ((508)c, (509)c, (510)c). Note also that the causative use can only have an inchoative interpretation (512)e.

(512) a. The stadium stands in Stepney.
b. Stacey is standing in Stanley.
c. Stacey stood up.
d. Stacey stood the stepladder on the edge of the cliff.
e. *Stacey is standing the stepladder.

In summary, many verbs capable of appearing in unaccusative constructions (be they telic, dynamic but not telic, or stative) can also appear in causative constructions and vice-versa. This pattern appears to be regular and systematic, in that it applies in the same way to large numbers of verbs. The challenge to lexical semantics is to develop an explanation of the systematic nature of the pattern, explaining how the changes in valency and meaning are controlled, what the mechanisms are that allow for this alternation in valency and meaning and what the limits of the regular mechanism are (which (classes of) lexical items does it apply to and which not, and why).

In the following section I discuss some analyses collected from the literature on this alternation, in the course of which I also note some further data to be included in our explanation. In the final section I present a WG account, and consider the conclusions that it provides for the structure of the lexicon. In considering the analyses in the following section, I address specifically three questions about the kinds of lexical structure proposed in each: what kinds of information are represented in lexical semantic structure; does the causative unaccusative alternation rest on a single underspecified structure, on an ambiguous structure, or on two separate but lexically related structures; what is the nature of event types, and how do they affect the behaviour of verbs (more specifically: how are verb senses and their argument structures represented and how are they mapped on to event types)?

5.2.2 A survey

5.2.2.1 Croft

The first analysis I present is that of Croft (1990). Croft describes the alternation under investigation under the label "the flexible conceptualisation of events" (49): the analysis assumes that events, the meanings of verbs, are classified into a limited set of event types (in fact into three alternative views of the same event type). This idealisation (conceptualisation) is constrained by the thematic properties of the event, so that the alternating verbs, like BREAK, are those whose events can be conceptualised in more than one way (flexibly).

In this way, Croft's analysis is a 'vagueness' analysis: it assumes a single underspecified lexical structure for each verb. The three alternative event views constrain the interpretation of events that are conceptualised through them by a grammatical process called "coercion" (or "conversion" when it also involves morphosyntactic variation), which applies so systematically and regularly across the lexicon that it can be considered a pragmatic process operating over unambiguous lexical items: "the ambiguity analysis is unattractive in this case because the ambiguity is systematic" (ibid: 55).

The event types that structure the conceptualisation of events consist of segments of a causal network. Croft holds that causation provides the primary framework for understanding event structure and verb meaning. He recognises three

broad approaches to the representation of causal relationships, which he characterises as **events cause events** (attributed to Davidson 1967), **individuals bring about events** (attributed to Gruber 1976, Dowty 1979), and **individuals act on other individuals** (attributed to Talmy 1972, 1975). Croft's illustration of these three approaches is given here:

events cause events

Rock(r) & Window(w) & Contact (e_1, r, w) & Become-Broken(e_2, w) & Cause (e_1, e_2)

individuals bring about events

Cause(r, Become(Broken(w)))

individuals act on other individuals

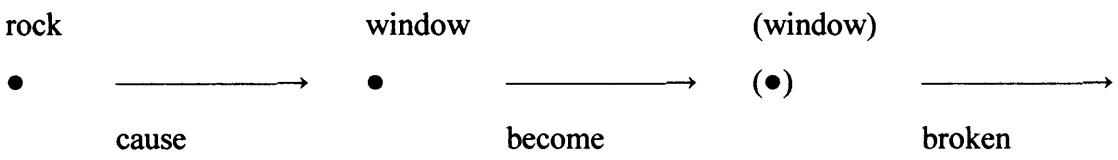

Table 7. Three models of causal relations.

Croft favours the third approach on the grounds that it constrains the structure of the causal chain by excluding causally related events which do not share any arguments in common (consistent with our "commonsense model of causation" (1990: 50)), and also because the causal ordering of participants can be used in the expression of linking rules.

Levin (1993) and Levin and Rappaport Hovav (1995) (5.2.2.2) provide an example of the first approach (**events cause events**), Jackendoff (1990) the second (**individuals bring about events**) and Lemmens (1998) (5.2.2.3) the third (**individuals act on individuals**). The WG analysis I present in the following section assumes the first approach. This approach is more helpful there because it provides conceptual nodes representing the events in conceptual structure (that support the properties of events: time, duration, etc). Most of the causal structures developed do involve only causally related events sharing an argument, as Croft suggests, but it is my claim that the relevant event types need to be learnt in order to acquire the

"commonsense model" that Croft refers to. The causal ordering of participants is mediated in WG through the relationships er and ee; Croft's analysis does not make use of argument structure positions like these.

Croft's event types are Idealised Cognitive Models (ICMs, see Lakoff 1987) and the idealisation has observable effects on verbal behaviour. The alternation between *load the bus with beer* and *load the beer on the bus*, for example, comes about because the conceptual structure of loading can be idealised in one of two ways. Also, significantly, each event type is in principle available as an ICM for any verb (any predicator: Croft's account includes adjectives). This means that (universally), all predicators should be able to appear in each of the three constructions exemplified in (513).

(513) a. The boys broke the window.
b. The window broke.
c. The window is broken.
(514) a. Kenny killed the kangaroo.
b. The kangaroo got killed.
c. The kangaroo has been killed.

Some predicators must undergo morphosyntactic variation in order to appear in one or other of the constructions ((513)c, (514)b-c). Whether this will be so for a given event (verb) (in a given language), and which of the three event types it will apply to is predicted on a pragmatic basis, the (morphosyntactically) unmarked representation(s) being the most plausible given the meaning of the predicator.

All this means that the variation in (513) is mediated by a **pragmatic** model (in the terms of Croft 1998a, see 5.1.2). In the WG terms presented above, BREAK is not ambiguous: one lexical item suffices, since the differences in meaning are due to the coercion of the verb's meaning by the three constructions.

This analysis depends on a separation of the semantic properties of events: the force-dynamic properties are represented in the "event-type" and the thematic properties in the "event-class" (Croft 1990: 53). Only the former have an effect on

syntactic structure. A similar sort of separation is seen in other frameworks (Jackendoff 1983, 1990, Levin and Rappaport Hovav 1995) (see 2.2.1.1, 5.2.2.2).

The ideas discussed here are further developed in Croft (1998b), where specifically the restriction of event types to causatives, unaccusatives and statives and the claim that all verbal profiles (which necessarily conform to one of these event types) have the causative structure as their base are revised. The revised constraint on verbal profiles is that they correspond to some (continuous) section of the causal chain that defines event types. The base against which the verbal profile is construed must also be a segment of the causal chain, and in morphosyntactically unmarked cases the profile and base are the same (ibid: 48).

This revision allows, for example, the profiles of activities (*sparkle*, *dance*, *walk*, ...) to consist of segments of the causal chain not terminating in a result state. It is not clear (to me) how the appropriate segment of the causal chain is selected for a particular verb's profile. The most appropriate mechanism would be to consider thematic (wider conceptual) properties of the verb's meaning, but under Croft's analysis this is ruled out.

Once established, the verb's profile directly determines its combinatorial properties: the argument positions in its event structure template are instantiated by other elements in the combinatorial structure.

5.2.2.2 Levin and Rappaport Hovav

The lexical semantic structures and linking mechanisms of Levin and Rappaport Hovav are described above (3.1.2). Here I characterise the way in which that system is applied to the causative alternation. For the most part the analysis described here derives from Levin and Rappaport Hovav 1995, though some attention is paid to Levin 1993 and Rappaport Hovav and Levin 1998.

Levin and Rappaport Hovav's semantic structures are decompositional: they are structured predicate argument representations. As for Croft, these semantic structures are idealisations from general conceptual structure. Projection of lexical semantic structure onto syntactic structure is mediated by a level of predicate argument structure (PAS), which determines the number and status of the syntactic arguments.

Lexical semantic structures are made of two types of component (Rappaport Hovav and Levin 1998: 107): primitive predicates, which make up the event type structure, and constants, which represent the thematic (idiosyncratic) semantic content (see 2.2.1.1). As for Croft, there is a finite set of event types, which in Rappaport Hovav and Levin are termed **event structure templates** (ESTs), made out of primitive predicates. The lexical semantics (event structure) of a verb then consists of a suitable event structure template, enriched by the constant associated with the verb.

This classification of components of semantic structure is the same one as we have met before. I suggest above (3.1.3, 3.1.4.3), and Rappaport Hovav and Levin suggest in a footnote (1998: 99) and in their appendix (127-130), that this separation of event type structure and idiosyncratic lexical semantics closely matches the separation of constructional meaning from lexical (verb) meaning found in other theories (eg Croft 1990, Goldberg 1993, and indeed the present work).

The implication of this is that the analysis outlined by Levin and Rappaport Hovav (1995), which is framed in terms of event structures lexically associated with verbs and the different ways they can project onto syntactic structure, is translationally equivalent to an analysis framed in terms of independent event structures (that determine the kinds of syntactic structure that they support). The mechanisms that, in Levin and Rappaport Hovav's theory, determine on the basis of general thematic properties which of the battery of ESTs will be associated with a given verb should, in principle, also serve to determine which of the battery of constructions a verb will be compatible with. Rappaport Hovav and Levin are themselves fully aware of this possibility, though they doubt (1998: 129-130) that any existing accounts are yet able to satisfactorily deal with the question of compatibility.

Under the account where the event structure is a lexical property of the verb, what must be explained, in the case of the causative alternation, is how a verb comes to be associated with more than one lexical structure. This can be achieved in one of two ways: either alternating verbs are ambiguous, having more than one lexical structure, or the structures themselves can undergo transformations of form. Levin and Rappaport Hovav favour the latter alternative for reasons of parsimony (Levin (1993) gives roughly 80 alternations, which in combination with more than 3000 verbs would lead to a very large number of verb senses, even allowing for the fact that not all verbs

participate in all alternations). They also adduce support for this decision from the apparent directionality of the alternation, quoting examples like (515), (516) to demonstrate that the causative use is more basic (Levin and Rappaport Hovav 1995: 85).

(515) a. He broke his promise/the contract/the world record.

b. *His promise/The contract/The world record broke.

(516) a. The waiter cleared the table.

b. *The table cleared.

The selectional requirements of the unaccusative versions of BREAK and CLEAR can be shown to be more specific than those of the causative uses: "the set of possible subjects for the intransitive use of a verb appears to be a subset of the set of possible objects for the transitive use of the same verb" (ibid: 86). If one use of the verb is to be seen as derived from the other, then it is difficult to imagine how it can be that the derived use has a wider range of possible arguments than the basic one (without proposing some mechanism for widening the set of possible arguments).

I argue below that other cases of the causative alternation show the opposite directionality, and use this as evidence against the procedural analysis presented here. Levin and Rappaport Hovav do consider some of the examples I use in this way, giving them alternative analyses with the intention of demonstrating that they represent a separate phenomenon from the causative alternation.

Levin and Rappaport Hovav claim that verbs that permit both causative and unaccusative constructions are basically causative, even in their unaccusative uses. Their lexical syntactic representations are dyadic (having two arguments), which reflects the externally caused nature of the event they profile. Internally caused events lead to monadic lexical semantic representations. The dyadic event structure supports a dyadic PAS, with one external and one internal argument. These two arguments are linked, by the relevant linking rules, to the subject and the object respectively in deep syntactic structure. However, the dyadic event structure can also undergo an operation that prevents the causer argument from being projected to the lexical syntactic representation (the PAS). This results in a PAS with just one, internal, argument,

which by the relevant linking rule projects on to a deep syntactic object and thence to a surface syntactic subject.

This detransitivisation is seen as a binding (existential quantification) operation on the causer argument that takes place between the levels of event structure and PAS. This argument, once bound in this way, is not expressed at the lexical syntactic level. It applies only to externally caused events, as defined by their event structure representation. The relevant template is shown in (517) (ibid: 94).

(517) [[x DO-SOMETHING] CAUSE [y BECOME *STATE*]]

Some verbs denoting externally caused events (which therefore have event structures instantiating the template in (517)) do not allow their causers to be bound in this way as shown in (518)-(520).

(518) a. The baker cut the bread.

b. *The bread cut.(on the relevant interpretation)

(519) a. The terrorist killed/assassinated/murdered the senator.

b. *The senator killed/assassinated/murdered.

(520) a. Anita Brookner just wrote a new novel.

b. *A new novel wrote. (ibid: 102)

Levin and Rappaport Hovav explain this by appealing to the plausibility of the events denoted by the verbs in these examples being caused without outside agency. Cutting, killing and writing, it is claimed, all make particular requirements of their causers, so that it is not plausible to speak of a cutting, killing or writing event that happens without a causer. This idea is also found in Levin (1993), where participation in the causative alternation is restricted to "pure change of state verbs" (ibid: 9).

Other verbs that do not participate in the causative alternation, but exist only in intransitive uses behave as they do, Levin and Rappaport Hovav claim, because the events they denote are not plausibly caused by any external factor. Verbs like BLOOM and DECAY that refer to events caused by the internal properties of the affected

argument, and verbs of existence and appearance (LIVE, APPEAR, VANISH, etc) have monadic event structures and so, as explained above, do not permit causative uses:

(521) a. The cactus bloomed/blossomed/flowered early.

b. *The gardener bloomed/blossomed/flowered the cactus early. (Levin and Rappaport Hovav 1995: 97)

(522) a. A picture appeared (on the screen).

b. *The programmer appeared a picture (on the screen). (ibid: 121)

Levin and Rappaport Hovav note, as I do above (5.2.1.4), that manner of motion verbs also have both causative and unaccusative uses:

(523) a. The soldiers marched to the tents.

b. The general marched the soldiers to the tents.

(524) a. The horse jumped over the fence.

b. The rider jumped the horse over the fence.

(525) a. The mouse ran through the maze.

b. We ran the mouse through the maze. (ibid: 111)

as do some other activity verbs they call "non-agentive internally caused verbs", specifically verbs of (sound) emission:

(526) a. The baby burped.

b. The nurse burped the baby.

(527) a. The doorbell buzzed/rang.

b. The postman buzzed/rang the doorbell.

(528) a. The flashlight beamed/shone.

b. We beamed/shone the flashlight. (ibid: 115)

and verbs of spatial configuration (see 5.2.1.4):

(529) a. The bicycle leaned against the fence

b. I leaned the bicycle against the fence.

(530) a. A statue of Jefferson stood on the pedestal.

b. They stood the statue of Jefferson on the pedestal. (ibid: 128)

These three classes of apparently alternating verbs give the appearance of being basically intransitive (rather than transitive as required by the explanation just given). Levin and Rappaport Hovav take this as evidence that the alternation seen in the above sets of examples, while regular, is constrained by a different mechanism from that proposed for the alternation shown by verbs like BREAK. In support of this, they demonstrate that the transitive and intransitive variants of verbs in these three classes have properties that are not shared by the corresponding variants of the "pure change of state verbs".

They point out that while intransitive constructions with manner of motion verbs are insensitive to the presence of a preposition giving a destination, similar transitive constructions are impossible (or at least less common) without this preposition:

(531) a. The soldiers marched (to the tents).

b. The general marched the soldiers ??(to the tents).

(532) a. The horse jumped (over the fence).

b. The rider jumped the horse ??(over the fence).

(533) a. The mouse ran (through the maze).

b. We ran the mouse *(through the maze). (ibid: 111)

They also point out that these verbs make more particular demands on the semantic role of subjects in transitive constructions (534), (535), and show that in other languages (specifically Modern Hebrew) these verbs are morphologically marked when they appear in transitive constructions.

(534) *The firecracker jumped the horse over the fence. (ibid: 112)

(535) The firecracker broke the window.

Similar arguments are given for the emission verbs: the transitive construction is not permitted when the object refers to an animate entity or something that conventionally emits the relevant sound under its own steam:

(536) *The postman buzzed the bees.
(537) *The cloud seeding flashed the lightning. (ibid: 117)

For the verbs of spatial configuration, Levin and Rappaport Hovav show that there are irregularities on both sides of the alternation. They also claim that although most of these verbs permit intransitive constructions with an EST like (538), it is implausible to suggest that this can be derived from the EST supporting transitive uses of the same verb (shown in (539), ibid: 131).

(538) [y BECOME AT z */SPATIAL-CONFIG*]
(539) [[x DO-SOMETHING] CAUSE [y BECOME AT z */SPATIAL-CONFIG*]]

Summarising briefly, the account for the causative alternation given in Levin and Rappaport Hovav (1995) describes it as a process transforming dyadic ESTs (which otherwise project to dyadic PASs) into monadic ones (which project onto monadic and unaccusative PASs). This conforms to the **derivational** model of Croft (1998a). The decausativisation process does not apply to all verbs with dyadic ESTs, since some of these refer to events that are necessarily externally caused, and for this reason unaccusative constructions made with them have implausible meanings. It also does not apply to verbs that have monadic ESTs (evidently, since it is an operation on dyadic ESTs), some of which are unaccusative (and so match the intransitive variants of alternating verbs).

Further, there exist at least three classes of verbs that have ESTs to some degree matching one or other variant of the alternation (or both), some of which participate in superficially similar alternations, controlled by different mechanisms. In the case of the manner of motion verbs, the alternation is controlled by a process of causativisation applying to the basic, monadic EST, only in the presence of a directional phrase (again, this conforms to Croft's **derivational model** (1998a)). The

verbs of emission form two separate classes of verbs sharing the same constant and name; these verbs form "spurious" (Levin and Rappaport Hovav 1998: 119) pairs of causative and unaccusative predicates not related by lexical rule (this conforms to Croft's **polysemy model** (1998a)). A similar analysis is used for the spatial configuration verbs.

The lexical semantic structures are decompositional and made out of predicates and generic arguments that encode force-dynamic and aspectual meanings; positions in these structures can be filled by constants representing the thematic content of lexical words. It is the conceptual (non-linguistic) semantics of the lexical item that determines the type of event structure that is appropriate and the position to be instantiated by the constant. Linking between these structures and syntactic structures is mediated by a further level of predicate argument structure (PAS), that determines which of the arguments in the syntactic representation are expressed in surface structure. PAS is derived from event structure by linking rules that refer to argument positions in that event structure, and syntactic structure is derived from PAS by something like X-Bar syntax.

In the final section of this chapter, I make extensive use of some of the insights of this analysis, and offer some criticism of the basic mechanism (particularly the derivational process operating between eg transitive and intransitive ESTs).

5.2.2.3 Lemmens

Lemmens (1998) proposes an account for the causative alternation that is based on a "cognitive lexical-paradigmatic [=lexical/constructional] approach" (ibid: 22). This approach describes grammatical structure and specifically syntactic and semantic behaviour in terms of the compatibility of particular verbs with particular constructional schemas (rather like the alternative approach outlined by Rappaport Hovav and Levin (1998), discussed above).

The battery of available constructions (event types) is established according to the claims of Davidse (1991, 1992) that "the English grammar of causative constructions is governed by the transitive and ergative paradigms" (Lemmens 1998: 3). The lexical structures of individual verbs are determined by their own conceptual properties and it is these lexical structures that determine which are the appropriate

construction types. Variation, in this framework, is controlled by two kinds of mechanism: some regular alternations (for example the causative alternation, see below) are constructional, in that the relevant constructions themselves support the variability (any lexical item that supports construction C also supports construction C'); others are lexical, in that the relevant lexical items are compatible with more than one construction type. Lexical items that show variable behaviour in this second sense ('ambiguous lexical items') are arranged on a scale (similar to the ones discussed above in 5.1) ranging between vagueness through polysemy to homonymy (Lemmens refers to Tuggy (1993)). Many of the individual lexical items proposed by Lemmens consist of complex network structures representing more than one 'meaning'; it seems that these are to be taken as single lexical entries permitting a vagueness analysis for the kinds of variation the word shows.

The available construction types are defined according to two parameters, one force dynamic and the other thematic. Table 8, adapted from Lemmens (1998: 44), gives a selection of the construction types proposed by Lemmens (I have omitted pseudo-effective constructions, like *He died a slow death* and *The house blew a fuse* and middles, like *Stale bread cuts easily* and *The window opened only with great difficulty*). The argument structure representations ([AC-PROCESS-GO] etc) are explained shortly.

PARADIGM (thematic) / **CONSTRUCTION** (force-dynamic)	**TRANSITIVE** (Agent centred)	**ERGATIVE** (Medium centred)
EFFECTIVE	*John killed Mary* [AC-PROCESS-GO] *John killed* [AC-PROCESS-(GO)]	*John suffocated Mary* [IS-PROCESS-ME]
NON-EFFECTIVE	*Mary died/John is running* [AC-PROCESS]	*Mary suffocated* [ME-PROCESS]

Table 8. Selection of construction types from Lemmens (1998).

These construction types are classified in the first place according to the number of participants in the event structure: **effectives** have two participants one of which acts on the other in some way (the second participant may be unexpressed, as in *John kills*), and **non-effectives** have just one. Constructions are also classified according to their thematic structure, which is determined by the nature of the roles played by the participants. This second parameter is more closely related to the specific conceptual semantics of the individual verb, which determines which roles will be played by the participants (*suffocated* refers to an ergative event because the suffocator (medium) undergoes some process), but Lemmens is at pains to point out that the paradigm type is not an inalienable property of the verb: "it is incorrect to talk about ergative or transitive 'verbs', ... what is at issue is their transitive or ergative *use*" (ibid: 60 emphasis in original).

Individual verbs denote events, which are idealised according to one or other of the paradigms; some verbs, with non-prototypical or multiple meanings, can be idealised according to either paradigm. Lemmens (ibid: 58) gives the following diagram showing the range of possible idealisations of some verbs of killing:

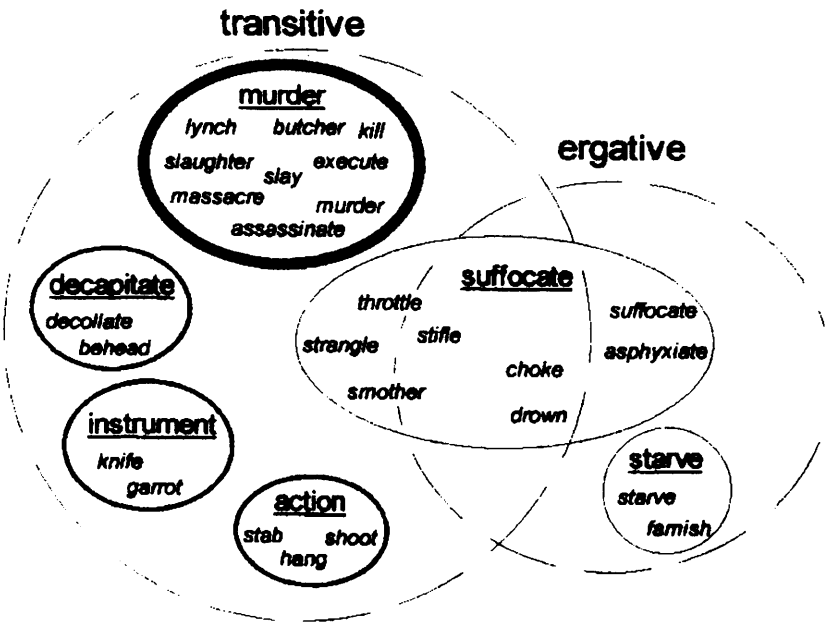

Figure 108 Lemmens on killing (and dying).

The two paradigms represent different ways of conceptualising causal events (processes). In Davidse's (1992) analysis, events are classified into relational, mental

and material processes, the latter class being further subdivided into transitives and ergatives. Halliday (1985) proposes a similar classification of event types, though for him the transitive/ergative distinction is logically prior. Halliday's transitive process types (discussed in 3.1.3) are existential, relational, verbal, mental, behavioural and material and these are collectively defined in opposition to the ergative processes. Lemmens adopts Davidse's classification.

In the ergative paradigm it is the affected argument that is understood as being most centrally involved in the process. This argument, called the **medium** (ME in the diagrams) by Davidse, "co-participates" in the process, and it is for this reason that the medium is selected as the single argument of non-effective ergatives. The other argument (the agent) in a two participant ergative structure is termed **instigator** (IS); this participant is not a central part of an ergative process, but may be present, since the process affecting the medium may be instigated by some outside agency.

The central participant in a transitive process is the **actor** (AC) who directly initiates and controls the process. That process (in two participant transitive structures) may be directed at a **goal** (GO), which does not "co-participate", but simply passively undergoes the relevant process. These two process types are characterised as in the diagram (taken from Lemmens: 41).

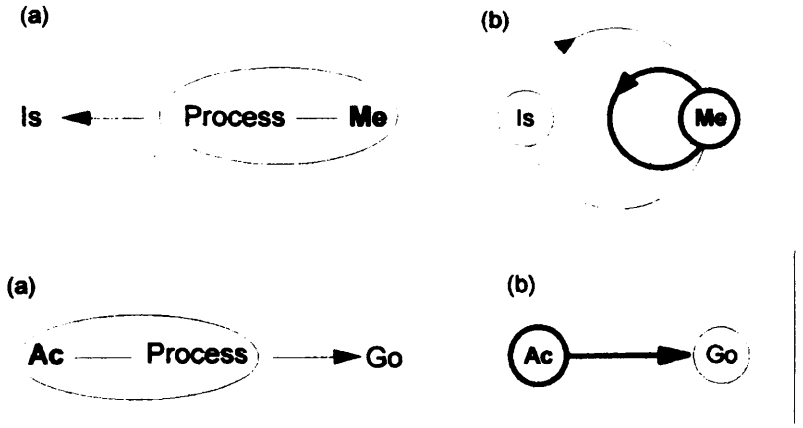

Figure 109 Ergative and transitive process types.

Each process type has two representations. The first representation of each shows the core participants ringed together (process and medium in the ergative structure, actor and process in the transitive). The arrow shows that the process can be extended in each case: the ergative structure can be extended "to the left" to include an

instigator; the transitive structure can be extended "to the right" to include a goal. The second representation of each shows the relationships between the participants and the processes. The ergative structure consists of two processes (or "processual layers" (ibid: 40)): the instigation (carried out by the instigator) and the process (undergone by the medium). The transitive structure consists of just one process, directed at the inert goal by the actor.

It is these process type characterisations that, for Lemmens, determine whether a verb participates in the causative alternation: verbs profiling ergative processes can exploit the extended or unextended ergative models, since the internal (Lemmens calls it "nuclear" ibid: 40) process and medium structure is able to exist independently of the instigator. Verbs profiling transitive processes do not support unaccusative uses in this way. The nucleus of this structure is the actor and process structure. Translating briefly into more traditional terms, both models support both transitive and intransitive structures. In the case of the **ergative** model, these are causative and unaccusative respectively. In the case of the **transitive** model, they are transitive and unergative respectively.

As noted above, Lemmens' model (of the causative alternation) relies on the interaction of lexical and constructional structures, rather than on alternative lexical structures for individual words (or word classes). However, because the different event types have different structures, verbs that are compatible with more than one event type must have more than one possible event structure. In the lexical framework employed by Lemmens this results in large lexical structures for each verb consisting of a network of schematic representations each of which represents a possible use of the verb. For example, the representation of the range of meanings of ABORT (ibid: 217) consists of a network containing eleven separate event schemas (five transitive and six ergative; see Figure 47).

The strength of the constructional approach is that it allows generalisations over event type structures to be abstracted from the lexical structures of individual verbs. This strength is not exploited in Lemmens' lexical structures, since the ability of a particular verb to appear in a particular construction is determined by the extent to which one of the verb's event schemas instantiates the relevant constructional schema, and so the constructional schemas need to be duplicated in the lexical structure of the

verb. Furthermore, the representations of verbal semantics do not make specific how the thematic properties of the verb's profile determine which event type structures are represented in the schematic network and which are not, so that while they duplicate information (about event structure) that can more effectively be represented elsewhere, they also fail to carry relevant information that is not represented elsewhere.

5.2.3 A WG analysis: properties of verbs in causative and unaccusative constructions; properties of 'alternating' verbs; the 'causative alternation'; limits of the alternation

5.2.3.1 The data

In the course of this chapter, I have introduced various examples involving causative and other expressions. These examples (and a few others I introduce here) constitute the data to be explained in the analysis that follows. For the most part, they exemplify what Levin (1993: 27) terms the **causative/inchoative alternation**, though it should be clear that the current analysis does not treat the pattern as an alternation (and that not all of the intransitive variants have inchoative uses (see note [41])).

Verbs that are central in this pattern are telic (change of state) verbs.[45] Many of these tolerate both causative and unaccusative constructions (540)-(541), though as Levin and Rappaport Hovav point out, some telic verbs tolerate either only causative or only unaccusative constructions (542)-(545).

(540) a. The burglars broke a window.

b. The window broke.

(541) a. The bats blackened the sky.

b. The sky blackened.

(542) a. The baker cut the bread.

b. *The bread cut.(on the relevant interpretation)

(543) a. The terrorist killed/assassinated/murdered the senator.

b. *The senator killed/assassinated/murdered.

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[45] Expressions like this ('telic verbs') should be treated carefully. I endorse Lemmens' warning, quoted above: "it is incorrect to talk about ergative or transitive 'verbs', ... what is at issue is their transitive or ergative *use*" (1998: 60 emphasis in original). Some words (perhaps many) have canonical aspectual and force-dynamic properties, and these may be described as 'telic verbs' or 'causative verbs' and so on from time to time, but this does not imply that they have only telic or causative uses.

(544) a. Anita Brookner just wrote a new novel.

b. *A new novel wrote. (Levin and Rappaport Hovav 1995: 102)

(545) a. *The gardener bloomed/blossomed/flowered the cactus early.

b. The cactus bloomed/blossomed/flowered early. (ibid: 97)

That BREAK IS telic can be seen from (546)-(548). Similar examples could be constructed for the other verbs in (540)-(545).

(546) a. The burglars broke the window in/*for ten minutes.

b. The window broke in/*for ten minutes.

(547) a. The burglars broke the vase to bits/*leaky/*useless.

b. The vase broke to bits/*leaky/*useless.

(548) a. *The burglars broke the room draughty/themselves into jail.

b. *The window broke the room draughty/the burglars into jail.

However, both causative and unaccusative constructions are possible with verbs that do not receive telic interpretations ((549)- (551)). The verbs in (549) refer to processes: in both cases Warren wobbled for the specified time; in (a) it was because Wesley acted to cause it. The examples in (550) refer to ongoing processes and not to soon-to-be-completed accomplishments like the corresponding examples in (551).

(549) a. Wesley wobbled Warren all afternoon.

b. Warren wobbled all afternoon.

(550) a. Wesley is wobbling Warren.

b. Warren is wobbling.

(551) a. The elephants are breaking the bridge.

b. The bridge is breaking.

Causative and unaccusative constructions with WOBBLE can receive telic interpretations: imagine (552) in the context of a wobbling competition. WOBBLE can refer to an event of starting to wobble, both causatively and unaccusatively. (553), adapted from Lemmens (1998: 43), makes this point for BOIL: ((553)a is ambiguous

since, though the process undergone by the water necessarily lasted for 30 minutes, Billy's involvement may have lasted considerably less (he may have put the pan on the stove and then sat down to do the crossword). Causative boiling consists of two events: the act of causing the water to boil (either bringing it to the boil, or acting to keep it boiling), and the boiling itself (either coming to the boil, or boiling continuously). ((553)b is not ambiguous in this way.

(552) a. Wesley won: he wobbled Warren in 2 minutes 28.

b. Wesley won: Warren wobbled in 2 minutes 28.

(553) a. Billy boiled the water for 30 minutes.

b. The water boiled for 30 minutes.

Similar comments apply to the manner of motion verbs (including, sometimes, WOBBLE): unaccusatively they refer to processes, which may be directed, and are not by themselves telic though they do not exclude telic interpretations. Causatively they refer to processes induced by the causer; mostly these causative uses require a directional expression, though where the activity has some alternative purpose this requirement can be overridden; like the unaccusative uses, causative uses may or may not be telic.

(554) a. Wally walked Stephanie around town (all afternoon)/to the station (in 25 minutes).

b. Stephanie walked around town (all afternoon)/to the station (in 25 minutes).

Finally, some verbs that canonically refer to states of existence, or to postures/positions (which are states), as well as some that canonically refer to changes in configuration or position can be used both unaccusatively and causatively in telic expressions. In the former case, these refer to inchoative events (assuming or causing to assume the relevant position) (555). The causative use cannot receive a non-telic interpretation ((556) refers to a soon-to-be-completed accomplishment, not to an ongoing state).

(555) a. Teacher stood Stanley up/on the stool.

b. Stanley stood up/on the stool.

(556) They are standing the statue on the plinth.

(557) a. Ferdie furled his umbrella.

b. Ferdie's umbrella furled.

The questions that must be addressed with respect to these examples are as follows:

- What are the shared properties of verbs that can appear in causative constructions, and of verbs that can appear in unaccusative constructions (what do BREAK and BLACKEN share with CUT, WRITE and KILL etc on the one hand and with BLOOM etc on the other)?
- And what are the properties that distinguish verbs that appear in either construction from the superficially similar ones that do not (what distinguishes BREAK and BLACKEN from BLOOM etc on the one hand and from CUT, WRITE and KILL etc on the other)?

Causative expressions refer to complex events: the meaning of a causative construction consists of at least two dynamic events (as shown in (553)). One of these events causes the other, and this second event is usually itself telic (as in (555)a), though it may refer to a process (as in *Wally walked Stephanie around town all afternoon*, where the causing event is also a process). The second event, however, may not be a state.

The examples in (518)-(520) and (545) show that some verbs that we might expect to appear in both constructions do not. The verb in ((518)a (*The baker cut the bread*) refers to a dynamic event, which causes a second dynamic event affecting the referent of the object, just as the verb in ((541)a does. The verb in ((541)b refers to that second event, which is dynamic and results in a state predicated of the referent of the subject (the sky being black), (518)b (*The bread cut*) is not possible (on the relevant interpretation), even though it apparently ought to refer to a corresponding event. These exceptions must be explained.

Further facts to be accounted for, involving these constructions or verbs that can appear in them, derive from the writers discussed above. For example, Croft

(1990) notes that verbs and other predicators that do not permit particular constructions do frequently permit other morphosyntactically marked constructions with the same meanings (see 5.2.2.1):

(558) The food made John sick.
(559) The vase is broken.
(560) Torey is all danced out.
(561) The trench got dug yesterday.
(562) I got cut on the arm. (ibid: 56-57)

Also Levin and Rappaport Hovav (1995) note that some verbs that can appear in both constructions are more limited in their range of arguments in one construction or the other (see 5.2.2.2):

(563) a. The wind cleared the sky.
b. The sky cleared.
(564) a. The waiter cleared the table.
b. *The table cleared. (ibid: 104)
(565) a. The postman buzzed the door bell.
b. The door bell buzzed.
(566) a. *The postman buzzed the bees.
b. The bees buzzed. (ibid: 117)

5.2.3.2 Properties of verbs in causative and unaccusative constructions

I begin this section with a comparison of the relational structure of WG with a predicate-based decompositional structure like that proposed by eg Levin and Rappaport Hovav (1995). Compare the predicate argument structure for KILL in (567) with the relational structure in Figure 110.

(567) KILL: [CAUSE (x, [BECOME (y, [DEAD])])]

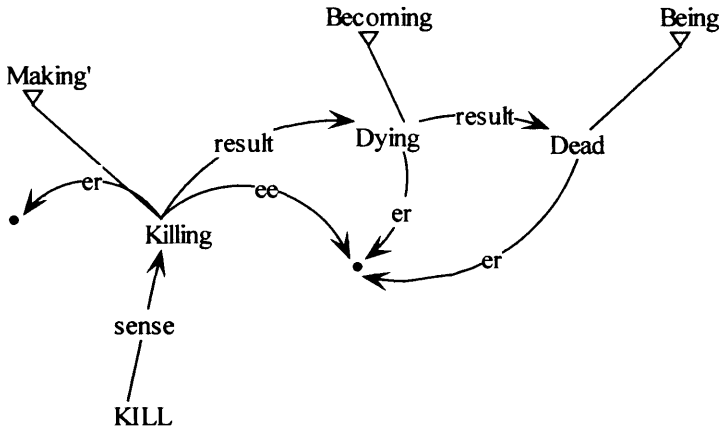

Figure 110 KILL

The predicate argument structure contains three predicates, CAUSE, BECOME and DEAD, and two other elements, x and y, the arguments of the predicates. The predicates are of two kinds: the first two are Events and the third a State, and this forms part of the definition of CAUSE, BECOME and DEAD. The arguments are of another kind: they are Entities. The relationships between the different elements are defined by their positions in the structure: x is an Agent by virtue of being the first argument of CAUSE, y a Theme by virtue of being the first argument of BECOME, and so on. In predicate argument structure the categories of the elements are basic and the relationships between them are read off the structure.

In the relational structure the opposite is the case: the relationships are basic and they define the categories of the elements. The elements themselves are not differentiated except by the relationships they participate in: Dying is Dying because its result is Dead, and it is an example of Becoming because it has one other argument (the er) besides its result; similarly, Killing is Killing because its result is Dying and it is an example of Making because it has two other arguments (er and ee) besides its result.

The difference between the two structures has a number of consequences, three of which are, briefly, discussed here. Perhaps trivially the relational structure permits us to show that the affected of Killing, the er of Dying and the theme of Dead are the same entity (this can be achieved in the predicate argument structure by means of coindexing). More significantly, though, since the elements are defined by their relationships, they can be defined in more than one way. For example, Electrocuting is

an example of Killing, but also of Electrifying, which defines the manner (see Figure 111).

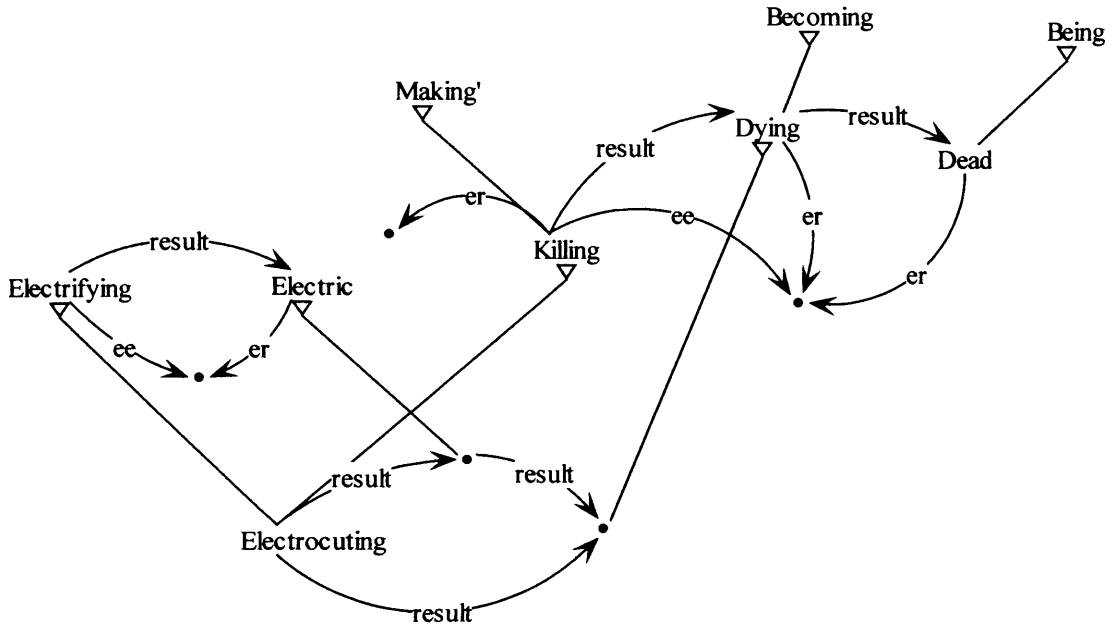

Figure 111 Electrocuting.

Figure 111 shows that Electrocuting is a kind of Killing, from which it inherits its causal structure, and that it is a kind of Electrifying, from which it inherits other properties (the application of Electricity to the ee by the er etc). This information can only be integrated into the predicate argument structure by introducing a further predicate into the structure (568). Notice that the network structure makes explicit the relationship between the killing and the electrifying (they are the same action), while the predicate argument structure cannot.

(568) ELECTROCUTE: [CAUSE (x, [BECOME (y, [DEAD])], BY [ELECTRIFY (x,y)])]

The relational structure provides for greater expressiveness in a third way. The predicate argument structure in (568) places the predicate DEAD in the argument structure of KILL, and so it represents a claim that all things that are dead are so as a result of having been killed; the relational structure in Figure 110 encodes a similar claim. However, the relational structure provides the means of representing a different claim: that Dying may occur not as a result of Killing (and indeed that being Dead may

occur not as a result of Dying); this position is represented in Figure 112, where the result of Killing **isa** Dying (so that some cases of Dying are not the result of Killing) and the result of Dying **isa** Dead.

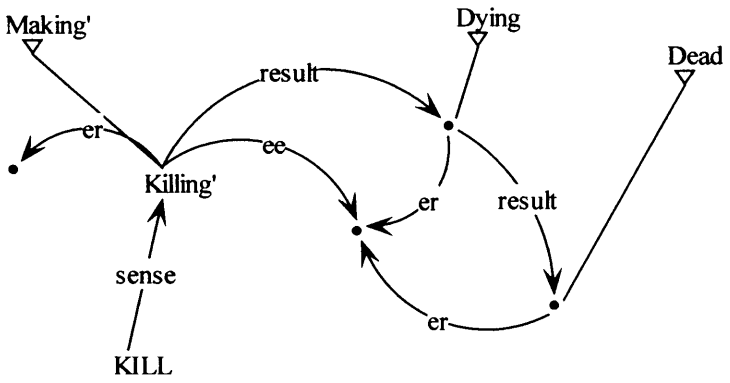

Figure 112 Killing'.

Whichever of these analyses may be appropriate in the case of Killing and Dying (below I give evidence for the latter analysis), there will assuredly be cases that call for the contrasting analysis. The relational structure provides the means of representing this distinction, whereas the predicate argument structure does not.[46]

The lexical semantic structure given in Figure 112 is linked into the syntactic structure of sentences as shown in Figure 113, which gives a partial structure for *Kathleen killed the kangaroo.*

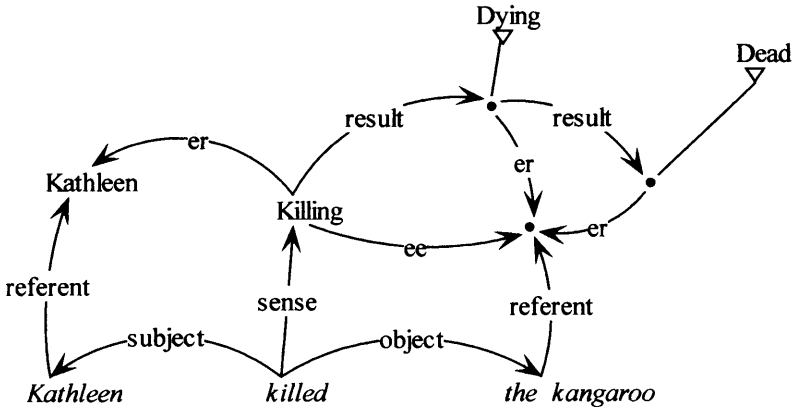

Figure 113 *Kathleen killed the kangaroo.*

[46] It may be argued that the predicate argument structure in (567) does not represent the claim that all cases of DEAD are results of KILL, since predicates appearing in the argument structures of other predicates stand in for concepts that instantiate the relevant category. In this case the argument given here still applies, mutatis mutandis.

The er and ee relationships have been linked, as described above (1.2.4.2, 1.2.4.3, 3.1.4), to the subject and object relationships respectively. The linking of er and subject is mediated by the subject construction identified in 1.2.4.3 and that of ee and object by the object construction identified in 1.2.4.2.

The semantic structure assigns the er and ee relationships in the way that it does because it conforms to a general semantic model for causative events (this is represented by the Making event which Killing instantiates). Unaccusative events conform to a similar model (represented by the Becoming event which Dying instantiates). Figure 114 shows a partial structure of the sentence *Skippy died*, which is structured according to this second model.

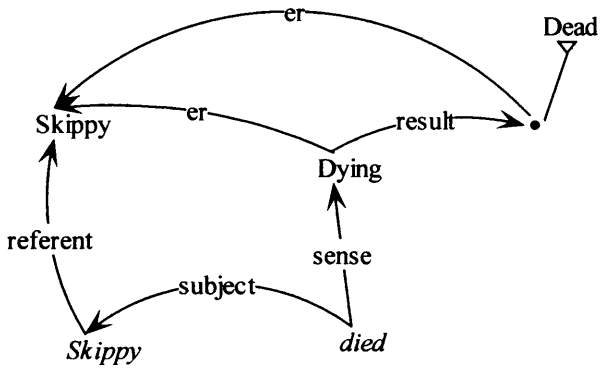

Figure 114 *Skippy died.*

Here the er has just the same force dynamic properties as the ee in the causative construction. This follows from the semantic structure of Becoming and more generally from the fact that there are no events in lexical structure that have an ee and no er. The structures of Making and Becoming are shown in Figure 115.

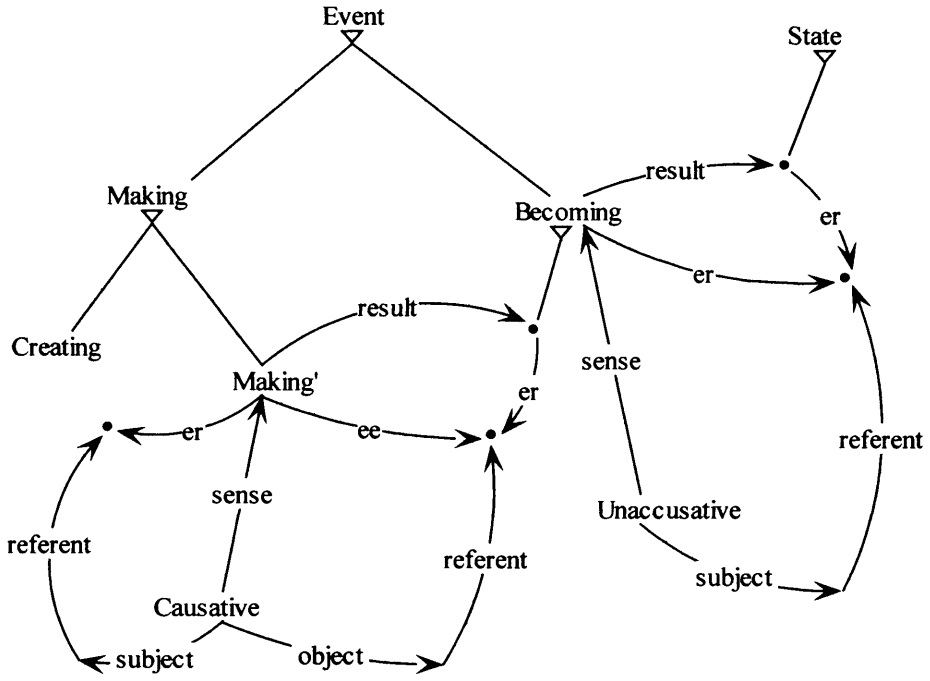

Figure 115 Causative and Unaccusative.

Making and Becoming are generalisations over events, defined by their causative structures (they are therefore equivalent to Croft's event types (1998b)), but they are also the senses of the ordinary verbs MAKE and BECOME respectively. Additionally, these two concepts are schematic for the senses of verbs referring to causative and unaccusative changes of state (verbs in causative and unaccusative constructions) and, along with their force dynamic properties, they have a number of thematic properties, including some of those associated with the subject and object linking rules.

5.2.3.3 Properties of 'alternating' verbs

The structure of a causative construction using BREAK should clearly match that given for KILL above (see Figure 113). Similarly, the structure of an unaccusative construction using BREAK should match that given for DIE above (see Figure 114). This implies that BREAK has a lexical semantic structure compatible with that shown in Figure 116, where Breaking/c represents causative breaking and Breaking/u unaccusative breaking.

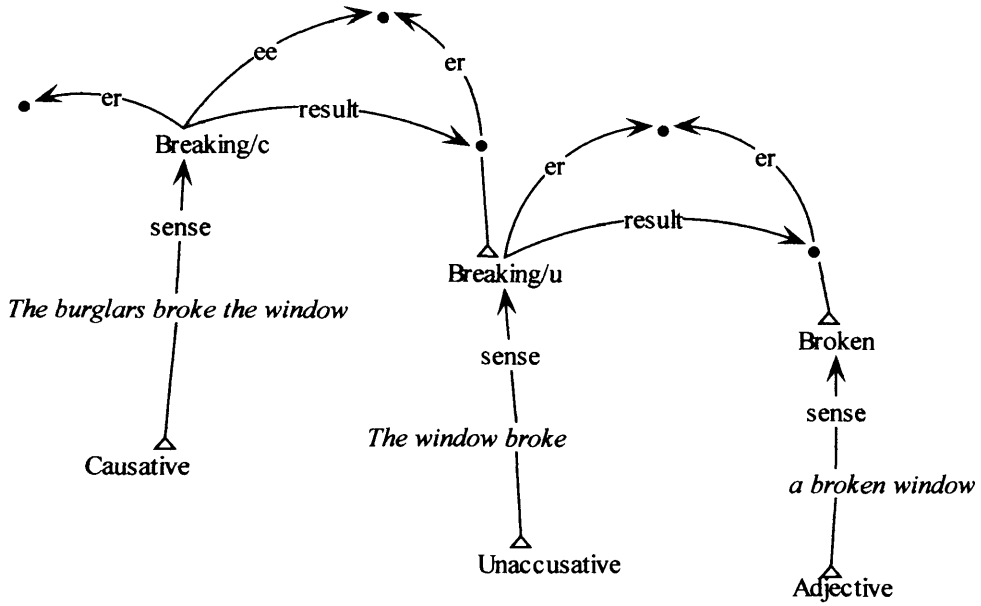

Figure 116 Two Breakings.

If both these semantic concepts are permitted as the sense of a verb with the base {break}, then causative and unaccusative constructions with such verbs can be straightforwardly structured in the same way as those with KILL and DIE respectively. The question is how this non-monotonic relationship between form and sense is to be mediated. Clearly, according to the definition given in 5.1, this is a kind of ambiguity. In the following section, I consider which of the 8 kinds of ambiguity discussed there best fits the data presented here, but first I look at some somewhat different verbs that show a similar ambiguity.

The two constructions used in Figure 116 (Causative and Unaccusative) form a subset of transitive and intransitive verbs respectively. Causative instantiates those transitive verbs whose sense isa Affecting, and whose object therefore refers to an affected theme; Unaccusative instantiates those intransitive verbs whose sense isa Becoming and whose subject therefore refers to an affected theme (see 3.1.4.2, 4.1.3).

Causative and unaccusative breaking are necessarily telic. However, as was noted above (5.2.1.4, 5.2.3.1) some non-telic unaccusative verbs also have corresponding causative uses:

(569) a. Eddy boiled the egg (hard) in 5 minutes.

b. The egg boiled (hard) in 5 minutes.

(570) a. Billy boiled the water for 5 minutes.

b. The water boiled for 5 minutes.

The examples in (569) are telic: the result of the egg's boiling is that it is cooked hard; Eddy's action in (569)a (which lasts for part or all of the five minutes) results in the egg's boiling until cooked, and is therefore also telic. The examples in (570) refer to processes: the water's boiling extends over five minutes. However, the causing action may be telic: as noted above (5.2.3.1), examples like (570)a are ambiguous between an interpretation where the causer's action is instantaneous (and therefore telic), initiating the process undergone by the theme, and one where the causer's action consists of a process continuously maintaining the process undergone by the theme.

Examples like these conform to the pattern in Figure 116, except that the unaccusative sense is a process rather than an achievement/accomplishment. Integrating the pattern in Figure 116 with the aspectual structures presented in 4.1.2 provides for a structural explanation of the ambiguity: in the first case, the causer's action has as its result the set that represents the caused process; in the second, each member of the set is a causative event (so the interpretation is not telic). The relationship between the three uses of BOIL is shown in Figure 117. Boiling/u is the sense of unaccusative uses, Boiling/c of causative uses where the causer's involvement consists of a single action, and Boiling/c2 of causative uses where the causer's involvement is ongoing.

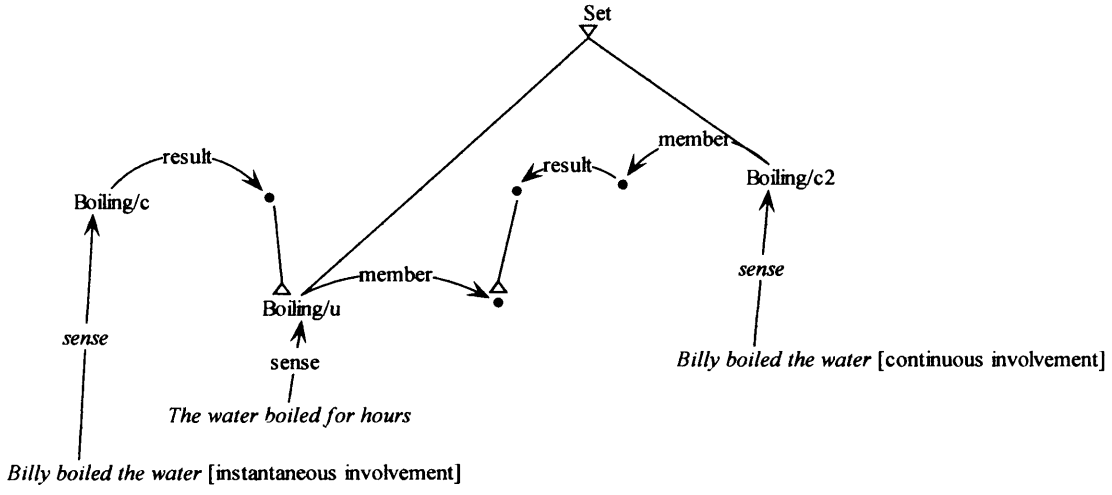

Figure 117 Three Boilings.

A similar relationship holds between inchoative and stative uses of verbs of spatial configuration, except that the interpretation where the causer's involvement is ongoing is not permitted. As noted in 5.2.1.4, a verb like STAND can be used in stative or eventive unaccusative constructions and in (telic) eventive causative constructions (571). The eventive (inchoative) unaccusative use refers to an event whose result isa (stative) standing; the causative use refers to an event whose result isa inchoative standing. The relevant structures are shown in Figure 118.

(571) a. The cathedral stands in a curve of the river.

b. The captain stood (up) on a chair.

c. They stood the dunces in the corner.

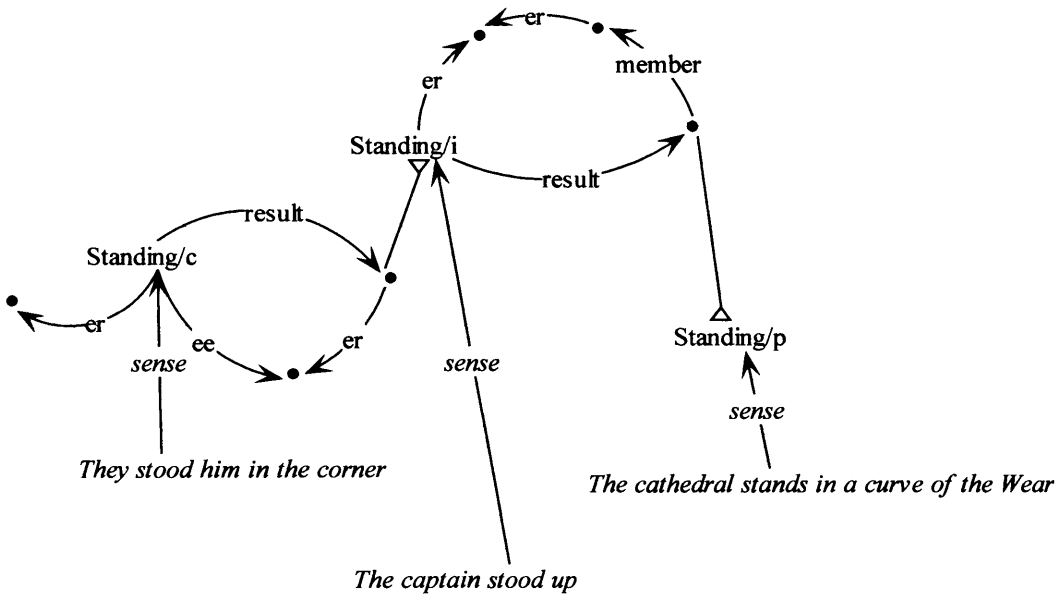

Figure 118 Three Standings.

The explanation of the 'causative alternation' consists of a specification of the lexical structures underlying the patterns seen in the above three diagrams. These lexical structures will determine the (morpho-)syntactic and semantic properties of the verbs in the causative and unaccusative constructions, and will also determine which verbs do and which do not show this kind of variable behaviour.

It was noted above that the pattern is widespread, affecting a wide range of verbs, so the lexical structure proposed to account for the pattern must be able to

generalise. It was also noted above, however, that the productivity of the pattern is limited in that there are verbs to which (contrary to expectation) it does not apply, so limits must be set on that generalisation. In the next section I explore the structures that license the variability, presenting two accounts of the way in which lexical items can be used in more than one construction and in the following section (5.2.3.5) I explore the limits of the alternation.

5.2.3.4 The 'causative alternation'

In each of the three diagrams above (Figure 116, Figure 117, Figure 118), the different verb uses share the same form, as noted, and (where relevant) they further share the same irregular morphology. The generality and productivity of the pattern suggest that it involves just one lexeme in each case. However, the fact that each use has a different syntactic valency appears to demand a treatment in terms of two lexemes. If there are two lexemes, it may be that one is derived from the other by a productive rule, or that they both have equal status as lexical units. The three possibilities are sketched in Figure 119. In the first case ('**polysemy**') the verb BREAK is ambiguous, just like DOG; it has a base {break} and two alternative senses Breaking/c and Breaking/u. In the second case ('**derivation**') BREAK is a basically causative verb with base {break} and sense Breaking/c; it additionally has an anticausative BREAK/dec which shares its base and has the sense Breaking/u (the anticausative relationship is a derivational relationship just like er-nominal (see 1.2.3.1) or like the denominal relationship between POCKET/n and POCKET/v). And in the third case ('**bivalence**') the two semantic concepts are the senses of separate verbs, BREAK/c and BREAK/u, which inherit their base from the more general BREAK. The first of these alternatives is a case of polysemy, the second and third of ambiguity between lexemes (see paragraphs e and g in 5.1.1).

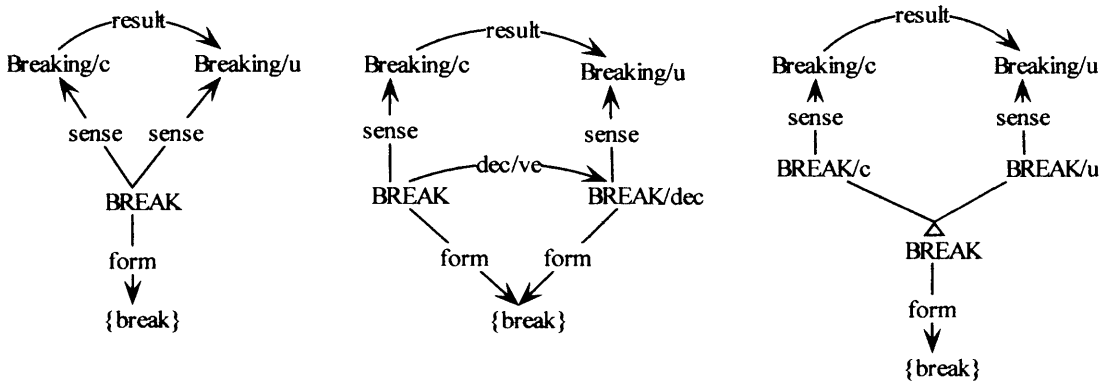

Figure 119 Three possible representations of the causative alternation.

The first model should be preferred, if only out of parsimony: the alternating verbs are so numerous that to propose an extra lexeme (an extra two lexemes in the case of the third model) for each one is to impose a heavy load on the lexicon. However, the fact that the verb's valency varies with the sense suggests that two separate lexemes are involved (since the lexeme is the locus of information about valency). The second model appears to satisfy these two conflicting demands, since it provides a generalised, productive mechanism that creates a second lexeme when it is required.

However, I argue against this middle way because of the predictions it makes of directionality. I also show that the linking mechanisms outlined in 3.1.4 allow the valency of a word to be predicted from the semantic structure of its sense, so that a single, polysemous lexeme may have two alternative valencies. While arguing for the single lexeme analysis in the first model, I note also that the two lexeme analysis in the third may provide for a more credible account of the way in which these structures are learned. Further, as argued by Croft (1998a, see above), mere generality does not provide sufficient evidence to rule out the more specific model, though I hold it as significant that no evidence exists that rules out the more general model.

The derivation model applies to verbs with the appropriate causative semantics, producing a matching unaccusative. Under this analysis the causative alternation would exhibit directionality, the causative pole being basic and the unaccusative pole derived. As noted above (5.2.2.2, 5.2.3.1), Levin and Rappaport Hovav advance evidence that the alternation does exhibit just this kind of directionality (*Something*

cleared the sky/the table: *The sky/*the table cleared*). However, just as there are verbs that are more basic in the causative use, so there are also verbs that are more basic in the unaccusative use. For example, while COLLECT has more causative senses than unaccusative ones ((572), (573)), GROW has more unaccusative senses than causative ones ((574), (575)).[47]

(572) a. We collected mushrooms in my hat.

b. His lectures collected large audiences.

c. I'm collecting money for Scope.

d. Do you collect stamps in Japan?

e. You can collect your parcel at the post office.

(573) a. The mushrooms collected in my hat.

b. Large audiences collected in his lectures.

c. *£500 collected for Scope.

d. *Do stamps collect in Japan?

e. *Your parcel can collect at the post office.

(574) a. The tree grew.

b. The goat grew.

c. A leaf/beard grew (on the tree/goat).

d. They grew tired.

e. My feelings of unease grew.

f. The business grew overnight.

(575) a. I grew a tree.

b. *I grew a goat.

c. The tree/goat grew a leaf/beard.

d. *The journey grew them tired.

e. *The situation grew my feeling of unease.

f. *The new acquisitions grew the company overnight.

[47] The examples quoted for COLLECT and GROW are constructed on the basis of a summary of the separate senses given in the OED (1989). They are distinguished by differences in the semantic class of the referent of the subject and object (transitive uses) and of the verb itself.

In order for causative COLLECT to attract the range of senses it has, it must have independent existence in the lexicon so it cannot be derived; and similarly for unaccusative GROW, so GROW provides counterevidence for the derivation analysis of the alternation (or we must introduce a second alternation that derives causative from unaccusative verbs).

A further argument against the derivation analysis is provided by Williams's target syntax argument (1991, see 1.2.3.3). This holds that where the properties of supposedly derived structures match those of non-derived ones, the generalisation over the two sorts of structure is most effectively treated as an argument structure construction in its own right. The existence of verbs appearing only in causative constructions and verbs appearing only in unaccusative constructions means that we must have argument structure configurations that account for these two kinds of construction separately (ie without one being derived from the other). Then to analyse anticausative verbs according to the derivational model, as opposed to the unaccusative construction is to imply that they are different in argument structure terms.

If we accept this argument then multiple valency can only be analysed in terms of the compatibility of the relevant lexeme(s) with more than one construction, as in the polysemy model, or in terms of two separate lexemes with single valencies as in the bivalence model.

The bivalence model certainly seems to be in accord with experimental findings in language acquisition (eg Tomasello and Brooks 1998, Brooks and Tomasello 1999), which show that children initially observe "strict lexical conservatism" (Pinker 1989: 17), learning and using lexical items only in the constructions they have been observed in and only later abstracting away from these specific pairings to more general construction schemas. However, if the relevant argument structure constructions are, as I have argued, tied to semantic, rather than syntactic, structures then these findings are also consistent with the polysemy model.

The mechanism that mediates the variable valencies of these polysemous items is the same as that that allows for the use of indirect objects with appropriate verbs (see 1.2.3.3). The valencies are determined by a set of constructions linking semantic and syntactic structures (the subject and object constructions identified above in 1.2.4.2,

1.2.4.3). The different sense of the alternating verbs participate in these constructions in different ways.

Possible counterevidence to the polysemy model comes from considerations of the limits of the alternation: if simply having resultative semantics is sufficient qualification to appear in both causative and unaccusative constructions, then what of those verbs that are constrained to appear in only one kind of construction? These cases are discussed in the following section.

5.2.3.5 Limits of the 'causative alternation'

If the 'causative alternation' is a product of general lexical patterns, then it should be expected to apply regularly to all those cases that conform to the relevant pattern. The prediction is that all verbs with eventive unaccusative uses should also have causative uses, and vice versa. However, as I have shown, KILL and DIE have causative and unaccusative lexical semantics respectively, yet they do not have corresponding unaccusative and causative uses. Other causative verbs without unaccusative uses include ASSASSINATE, MURDER etc, and some others like CUT; verbs with only unaccusative uses include APPEAR and VANISH. The structures of these verbs are discussed here.

(576) a. The general killed the slaves.

b. The slaves killed. ['the slaves killed somebody']

(577) a. *The priest died the goat.

b. The goat died.

(578) a. The terrorists assassinated the president.

b. *The president assassinated.

(579) a. The duke cut the ribbon.

b. The ribbon cut. ['the ribbon cut something']

(580) a. *The varlet vanished the violin.

b. The violin vanished.

The examples in (576)-(580) appear to show that not all verbs with resultative semantics participate in the causative alternation. For this reason they present possible

counterevidence to an account based on general lexical properties (as all the accounts discussed in this chapter are). Croft (1998a) argues that lexical idiosyncrasy provides evidence against generalised accounts of variable behaviour (see 5.1.2), since it requires information to be stipulated at the level of the individual lexeme. The generalisation can still be saved, however, by demonstrating that the apparent exception in fact conforms to the rule. In this case, this means in practice either that the generalisation must be amended to exclude the exceptions or that some property of the exceptional verbs must be shown to be preventing the missing uses. This is undoubtedly the intention behind Levin's claim (1993: 9-10) that only "pure" change of state verbs can participate in the causative alternation.

I argue here that the special properties these exceptional verbs have that prevent them from appearing in either causative or unaccusative constructions are thematic properties deriving from the representation of their full meaning in the network structure.

First CUT, which here represents a larger class of verbs with similar meanings, which also do not have unaccusative uses. Levin lists 43 "Verbs of Cutting" (1993: 156-157) divided into the "*Cut* Verbs" (of which there are 10) and the "*Carve* verbs" (of which there are 33). The behaviour of these verbs with respect to the causative alternation is the same as that of some others including BUILD. The meanings of CUT and the verbs like it are characterised partly in terms of the result, here represented by the state Apart (Hale and Keyser (1987) refer to a "separation in material integrity"), but they are differentiated from each other by the specification of the means by which that result is brought about. Many, like CUT, refer to the instrument used.

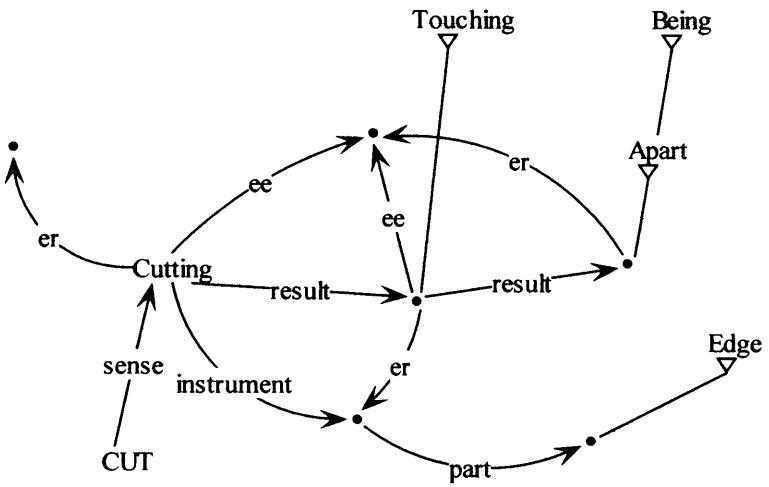

Figure 120 Lexical semantic structure of CUT.

The lexical semantic structure of CUT is shown in Figure 120. The agent of the Cutting acts on the instrument, causing it to come into contact with the referent of the object and this contact in turn causes the separation of material integrity (represented in the figure by the state (which isa) Apart). Notice that the result of the causative event (which isa Touching) has the instrument as its er, and the referent of the object as its ee. In this way, the presence of the instrument in the lexical semantic structure prevents the verb from appearing in an unaccusative construction, since the event that usually provides the sense in such a construction has the instrument as its er. (581) shows a sentence structured around this sense. The subject refers to the instrument and the object to the theme. Levin correctly identifies the presence of the instrument as the property that excludes these verbs from the causative alternation (1993:10).

(581) The sabre cut the ribbon.

The verbs that refer to acts of killing are also differentiated by properties of the causing event. Some, like ELECTROCUTE profile the means; others, like ASSASSINATE, the intentions of the killer.[48] The result in each case is the same: the victim (the killee) is dead. The referent of an unaccusative construction made with MURDER would be indistinguishable from that of one made with EXECUTE. Furthermore, they would both

[48] Assassination also specifies some properties of the victim: they must be a prominent political figure. However, this is not a sufficient condition for assassination, since such people can be accidentally killed, or murdered for non-political reasons.

be indistinguishable from that of one made with DIE (except in as much as only human beings can be murdered or executed) since in all three cases the theme simply undergoes an event that results in their death. A similar argument was made in 3.2.1 and 4.2.2.1 to account for the absence of stative passives made with certain resultative verbs.

Some verbs referring to ways of killing profile parts of the dying process, and these can be used unaccusatively. DROWN, SUFFOCATE and ASPHYXIATE all have unaccusative as well as causative uses, as does STARVE. This insight is captured by Lemmens (1998: 58) by assigning ergative semantics to these verbs (and transitive semantics to the other killing verbs). Lemmens' classification of the verbs of killing was given above in Figure 108, which is repeated here.

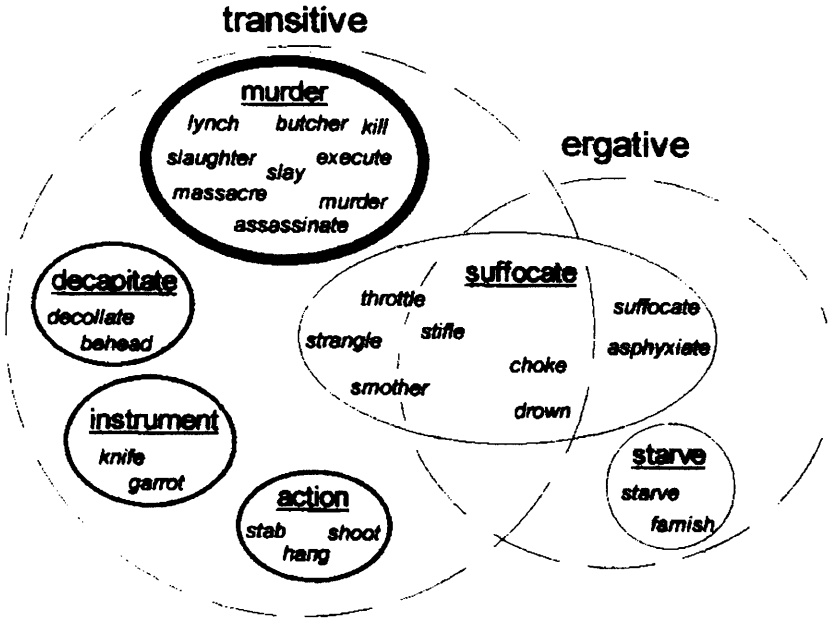

Figure 121 Lemmens on killing and dying.

The cross classification of the verbs of killing is required in Lemmens' framework since the class of the predicate profiled by a verb is the major factor determining its syntactic behaviour. In the WG framework, however, the behaviour of these verbs with respect to the causative alternation is explained by specific properties of their lexical semantic structures.

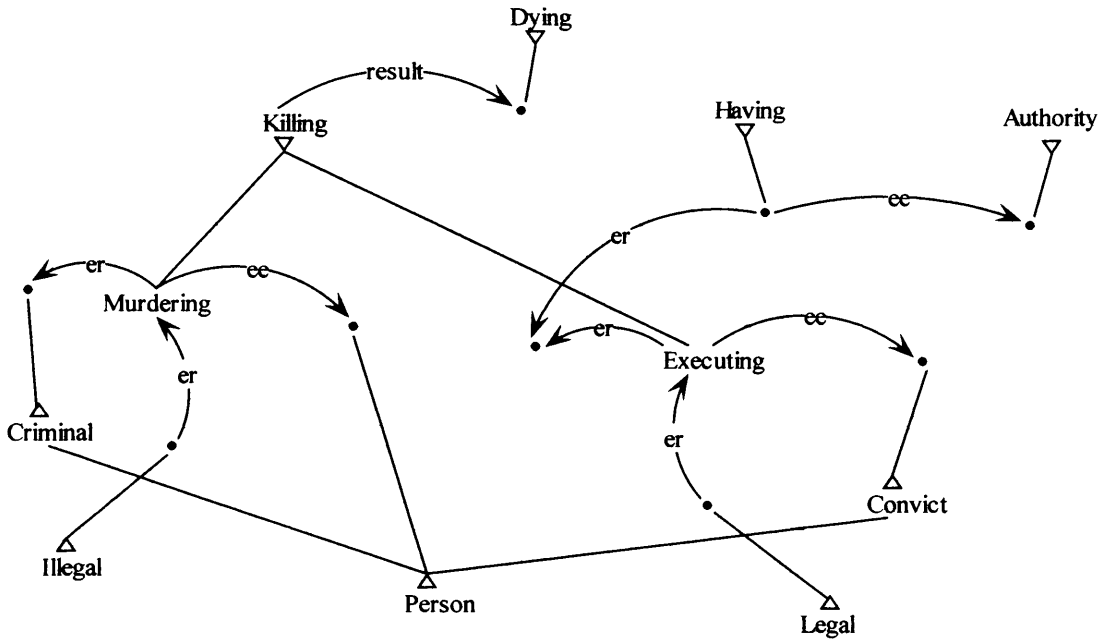

Figure 122 Killing, Murdering and Executing.

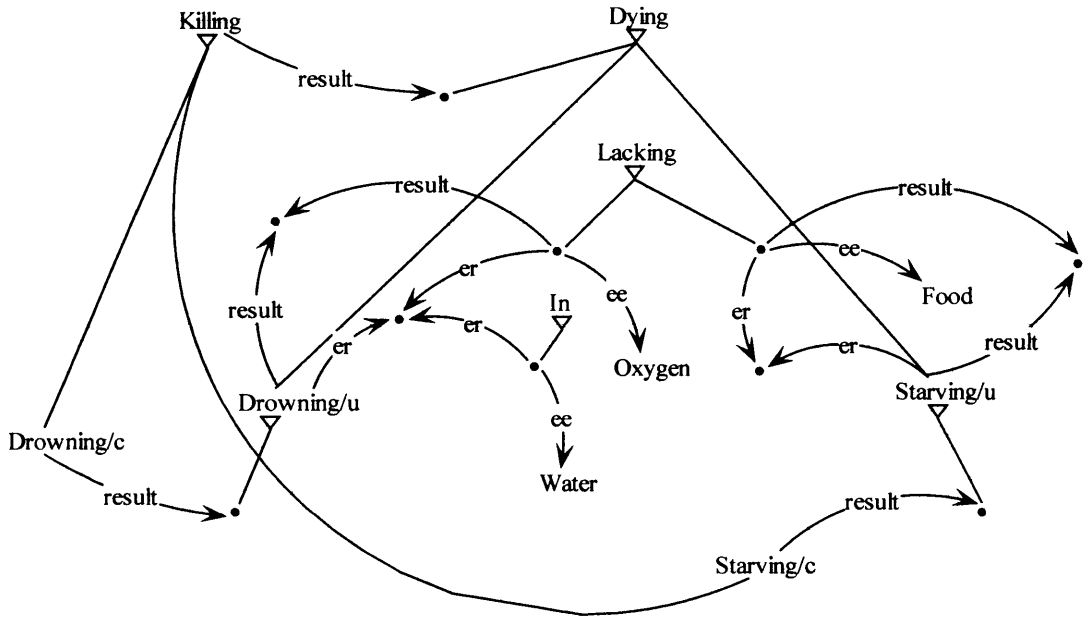

Figure 123 Dying, Drowning and Starving.

I now turn to those verbs which have unaccusative but no causative uses. As has already been noted, DIE refers to a change of state in the theme, and yet it has no causative use. Similarly verbs like (DIS)APPEAR profile changes of state and have no causative uses. In lexical terms this is very easy to explain: by simply assigning lexical

semantic structures to these verbs that have no causing event. Figure 124 shows the lexical structure of VANISH.

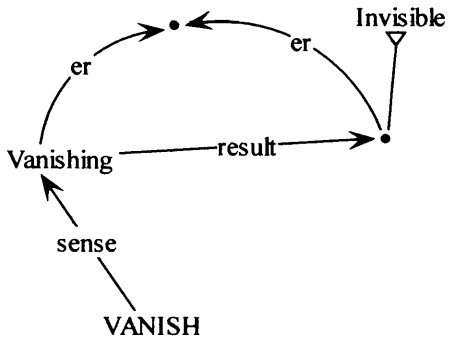

Figure 124 VANISH.

This rather begs the question, however, since it offers no explanation for the absence of a causative use (and indeed for the fact that 'creative' causative uses are also impossible with these verbs). This explanation turns on the fact that events like vanishing are typically "internally caused" (Levin and Rappaport Hovav 1995: 91). Responsibility for the vanishing event is held to lie with its theme: the vanishing takes place because of properties specific to the theme. This means that vanishing is an inherently unaccusative event and so is implausibly expressed in a causative construction.

Dying is similarly internally caused, in contrast with killing, which is externally caused. It is obviously part of our experience that things die from internal (or unobservable external) causes as well as from external causes; because of the significance of death (particularly in humans) it is of course important to be aware of the difference between internally and externally caused deaths. This awareness is encoded in the lexical semantics of the relevant verbs.

In this way, the 'non-alternating' unaccusative verbs are prevented from appearing in causative constructions by consideration of plausibility: they cannot be used in causative constructions because they refer to events which in normal experience are not caused by external agencies.

A similar argument applies to the verbs of motion. Most verbs referring to changes of location refer to explicitly externally or explicitly internally caused events. Some, like PUSH, refer to clearly causative events, involving the action of an agent on a theme resulting in a change in its location. Others, like STUMBLE, refer to clearly non-

causative events, involving an activity carried out by the theme that results in the change in location.

(582) Polly pushed the pea to Powys.
(583) Stanley stumbled out of the bar.

Under certain circumstances, some of these verbs can be used in non-canonical constructions. Some of these were discussed above (5.2.1.4, 5.2.2.2). (584) repeats (531) from above; (585) shows that this alternation is also available for canonically externally caused verbs of motion.

(584) a. The soldiers marched (to the tents).
b. The general marched the soldiers ??(to the tents).
(585) a. The gardener swept the leaves (into the barrow).
b. The leaves swept *(across the lawn).

The properties of verbs of motion, including those determining their behaviour with respect to the 'causative alternation', are discussed at length in 3.2.

5.3 Conclusion

5.3.1 The issues

A number of theoretical issues/parameters distinguish the analyses discussed above from each other, and from the WG analysis. Some of these are material to the analysis, while others are (with respect to the current data at any rate) more or less elective. They are discussed here, where I deal with the attitude taken to each issue under the analyses presented above:

lexical representations: What properties of the lexical representations of the verbs like BREAK support their ability to appear in more than one kind of construction? Specifically, is this variability constrained by the lexical representations of the verbs, or of the constructions? If the former, are the verbs polysemous (having more than one sense), do they form pairs of derivationally related but separate lexical

items, or are they simply vague (schematic)? If the latter how do the lexical representations of the words and the constructions interact?

classes and roles: Are the relevant generalisations over the behaviour of words in constructions more felicitously stated in terms of the classes of the various elements or in terms of the relationships they support? Does the category an element belongs to define its properties or do the properties define the class?

directionality: Is there a sense in which it can be said of a verb that can be used in more than one constructions that one or other of the uses is conceptually or logically prior or more basic? If there exists a meaningful directionality in the kind of variation under discussion, does it always operate in the same direction?

encoding of semantic properties: Are the properties of meanings best represented in decompositional (predicate argument) structures, or in entailments between semantic elements? Further, is there some principled difference in the roles played by words of different (syntactic) classes in the semantic representation?

division of properties: Can the properties of lexical structures helpfully be divided into classes that do or do not affect particular linguistic phenomena? Is there for example a difference between the structural and content properties of a lexical semantic representation, or between its force-dynamic and thematic properties?

Croft:

lexical representations: Croft's analysis of the kind of variable behaviour under discussion, as noted above, does not assume ambiguous lexical semantic representations for the relevant verbs. Instead, those representations are schematic (vague), and the semantics of compositional structures is determined, in part, by the properties of the event type (construction). Event types coerce the meanings of verbs by determining which portions of their thematic structures are to be expressed, and how.

classes and roles: Croft's analysis makes use of two kinds of class (see below): event class and event type (1990: 53). The former is a property of the verb (or other predicator), the latter a property of the construction. A word's event class is

determined by its thematic structure: by the kinds of thematic relationship it supports. The event class, however, does not affect syntactic structure, which is entirely determined by the event type (constructional schema).

The roles of arguments in the event type schema are determined by the schema itself, so that the linguistic structure of a composite expression is largely determined by the structure of the event type template, though as explored in the following paragraph, thematic (conceptual) properties do affect the kind of event type template that a word fits more naturally in.

directionality: For Croft, the causal chain that structures the force dynamics of event types constitutes an event prototype: "any event can be structured or conceptualised as the three-unit causal chain, 'cause-become-state'" (ibid: 58). This means that in principle any word that profiles an event (including changes of state, processes and states) can be construed according to any of the three views of the event structure (event types). That some words do so only in the presence of "conversion morphosyntax" (ibid: 59) (that their unmarked forms are found only in certain event views) is due to their thematic properties. In this sense, at least, it makes sense under Croft's analysis to say that a given word has, by virtue of its event class, a typical or salient event view: "a given event class (such as colours or acts of creation) has a prototypical event view" (ibid: 59). This is used to account for the exclusion of certain words from certain constructions (in their unmarked forms), but no case is made for there being events (or event classes) that while being conceptually more basic (natural) under one event view still can appear unmarked in one or more others.

The ability of a word's event class to affect the event views it appears in, noted above, should not be taken to imply that there is a causal relationship between the two properties: the event class helps to motivate the choice of event view, but there remains an element of convention, as demonstrated by the fact that similar event classes in different languages project onto different event views.

encoding of semantic properties: Croft's semantic structures appear to be essentially decompositional, in that each denotation consists of a number of subevents connecting the participants in the action chain. It is verbs (and other predicators like adjectives) that denote relevant sections of the causal chain, and their arguments fill the argument positions in that chain.

division of properties: Croft explicitly separates event type/view (which has force-dynamic properties and directly affects syntactic structure) from event class (which reflects thematic/conceptual properties and does not directly affect syntactic structure). As noted above, the latter is a property of verbs (or other words) and the former a property of constructions. This separation closely parallels the separation noted elsewhere (3.1.3, 3.1.4.3, 5.2.2.1) between structural and conceptual semantic properties.

Levin and Rappaport Hovav:

lexical representations: Levin and Rappaport Hovav's analysis of the causative alternation is a derivational one: the lexical structure supporting unaccusative constructions with a given verb is derived by rule from that supporting causative constructions. This rule is productive and applies to all lexical semantic structures that have the appropriate form, so that variability is a function of a verb's lexical semantic structure. Only one lexical structure is needed per verb, since the productive, and general, rule means that the unaccusative variants need not be stored in the lexicon.

classes and roles: Like Croft, Levin and Rappaport Hovav classify verbs into thematic classes. As I show below, Levin and Rappaport Hovav's predicate argument structure (PAS) plays the same role as Croft's event views and for Levin and Rappaport Hovav as for Croft the PAS is determined by the event class of the verb. The projection of thematic structure onto PAS is, for Levin and Rappaport Hovav, mediated by linking rules that refer to thematic argument positions in the thematic structure, yet the nature of those roles is determined by the event class.

directionality: Because Levin and Rappaport Hovav's account is based on a derivational relationship between the lexical structures supporting the two constructions, the directionality of that relationship is a crucial part of their account. So much so, in fact, that examples showing the opposite directionality need to be assigned to a separate mechanism. The derivational rule, by definition, applies to (all and only) members of one semantic verb class and derives those of another. The classes are defined by their participation in the derivation, which means that verbs that are superficially similar to one or other pole of the alternation but do not have uses corresponding to the opposite pole (as well as those verbs that have uses corresponding

to each pole but which participate in the alternation in a different way) must belong to some other class.

encoding of semantic properties: Levin and Rappaport Hovav's semantic structures are also decompositional. The lexical conceptual structure of a verb consists of a function argument representation. The predicates are primitive event types (CAUSE, BECOME, etc) and the arguments are variables to be instantiated in surface structure or constants representing the conceptual content of the verb's meaning. Generally speaking, verbs denote predicates and nouns their arguments. The contribution of prepositions to the semantics is largely ignored.

division of properties: The separation of predicates from arguments just described is also the basis for the separation of semantic information into event type structure (defined by the predicates), which directly affects (deep) syntactic structure, and thematic content (defined by the constants), which does not. The event type structure projects onto PAS, which contains no thematic information, and which constrains syntactic structure. As noted above, this PAS therefore corresponds to the event type structure of Croft's analysis (except in as much as it is explicitly a property of the word, rather than of the construction).

Lemmens:

lexical representations: In Lemmens' analysis, as in Croft's, it is principally the constructional schemas that define linguistic structures. A verb's lexical representation (thematic properties) determines which of the available event structure schemas it is compatible with. Some verbs are (because of vagueness or ambiguity) compatible with more than one event structure schema, but that is not the relevant property as far as the causative alternation is concerned: the causative alternation is controlled by the ergative paradigm (an event structure representation), which projects variably onto surface structure.

classes and roles: Although Lemmens' account of the causative alternation is founded on the event type schema elaborated by the verb, that event type schema is itself derived from the thematic roles associated with the verb: *suffocate* (usually) instantiates an ergative schema **because** it has a MEDIUM; *kill* a transitive one **because** it has an ACTOR. This is the way in which the thematic properties of a verb determine

the kinds of construction it can appear in (though the principles according to which the arguments of a particular verbal profile are classified as MEDIUM, ACTOR, etc remain somewhat unclear).

directionality: Because of the way in which the transitive and ergative paradigms are defined in terms of the ACTOR and MEDIUM roles respectively, there is an implicit directionality (there are in fact two implicit directionalities) in the effective/non-effective axis: transitive event structures are based around the ACTOR/PROCESS relationship, and can extend to the right to include a GOAL, whereas ergative event structures are based around the PROCESS/MEDIUM relationship and can extend to the left to include an INSTIGATOR. Notice that this means the directionality of the causative alternation is the opposite of that assumed by Levin and Rappaport Hovav.

encoding of semantic properties: Lemmens' conceptual structures are basically decompositional, in that event structure is broken down into separate processes and participants in those processes. Individual lexical items instantiate different parts of the event structure template, though there is no difference in kind between the contributions of words of different syntactic classes.

division of properties: In Lemmens' approach, force dynamic and thematic properties are separated, but they both contribute equally to linguistic structure. The event type structure of a verb is determined by a process of idealisation that funnels the (idiosyncratic) conceptual representation of the verb's meaning through one or other of the paradigms. The resulting structure contains both force dynamic and thematic information, the former represented in the effectiveness/non-effectiveness axis, the latter in the transitive/ergative axis.

Word grammar:

lexical representations: The problem of the 'causative alternation' is basically a linking problem, and so the mechanism that accounts for it in WG is basically a linking mechanism: verbs that appear in causative constructions do so by virtue of having the appropriate lexical semantic structures, and those that appear in unaccusative constructions likewise. The WG treatment of variability does not predetermine whether it will be mediated by ambiguous or vague lexical structures. The minimal assumption

is that each verb has a single lexical representation, which is compatible with more than one constructional semantics. However, this minimal assumption can be disproved by demonstrating that the individual uses have specific properties not predictable from the (meanings of the) two constructions (see Croft 1998a).

The presence of a separate sense in each use does not necessarily support an analysis in terms of separate lexemes, but other factors (eg argument selection properties shown in one use but not the other) may do in some cases. In these cases, properties common to the two uses are assigned to a single lexical item that is schematic for both of them.

classes and roles: WG linguistic structures are defined by the relationships that make up the conceptual network. The concepts and classes that encode lexical information do so by virtue of the relationships they support. The syntactic behaviour of a verb's arguments is determined by the dependency type they instantiate, and their semantic behaviour by their semantic role type. The event classes **causative** and **unaccusative** identified above to a great extent determine the linguistic structures of utterances, but only in that they represent the lexical structures of the relevant dependency types: the unaccusative construction represents a regular relationship between the subject relationship and a specific semantic role; the causative construction represents a regular relationship between the object relationship and that same semantic role (subjects in causative constructions have the same properties as subjects in other, more general, constructions).

directionality: In the WG account the appearance of a given verb in one or other construction is determined by the structural properties of the verb and the construction. The two constructions are not connected by a derivational relationship, so the analysis makes no predictions of directionality. Since the pattern is general (and more or less creative), the relationship between the two constructions must be expressed in a lexical structure, but that structure does not assign basicness to either construction. Individual verbs may be more usual either in one or in the other construction, but this is a function of their specific meaning and use, and so the basicness is a property of a given verb in the relevant construction, not of that construction in general.

encoding of semantic properties: The semantic structures of WG, as outlined in chapter 1, are decompositional in that the meanings of words are constructed of separate meaning components. However, unlike most decompositional analyses, these separate components are not viewed as contained in individual lexical semantic structures but rather form a network of mutually defining concepts. In this way, the relationships that delimit this conceptual network are much more akin to meaning postulates than to properties of decomposition: to say, as I do in 1.2.3.1, that the sense of GIVE has a result which isa Having (and that this is the sense of HAVE) is the same as to say that if you give someone something then they have it.

A second consequence of the network structure is that the logical kind of the concept that represents the meaning of a word does not depend on the word's syntactic class. In many decompositional approaches, the meanings of verbs are decomposed into predicate structures and the meanings of nouns and prepositions slotted into argument positions in these predicate structures. In WG, the meanings of words of all classes are represented in more or less complex bundles of relationships and the meanings of words that appear together in constructions fill each others dependent positions.

division of properties: As noted in several places above, WG does not distinguish between syntactic and semantic information, nor between lexical and structural information, nor between different kinds of semantic information either formally, in terms of the kinds of structure that represent it, or descriptively, in terms of the kinds of linguistic phenomena to which it is relevant. The three frameworks described above all recognise a separation of thematic and force dynamic semantic properties (though it is only in Croft's and Levin and Rappaport Hovav's analysis that this distinction determines which properties may and which may not affect the syntactic behaviour of verbs).

In Croft's analysis, this was expressed as a distinction between event class, a lexical property of verbs, and event type, a formal property of constructions. This distinction is reflected in the lexical structures of WG, since the behaviour of verbs in constructions is determined by the interaction between the verb's lexical structure and that of the relevant dependencies or constructions. However, this distinction is emergent (like that between syntax and semantics or that between lexical and

encyclopedic semantics, see 1.2.2, 3.1.4.1) and has no grammatical status. The only difference between the lexical structure of GIVE, say, and that of Ditransitive verbs (see 1.2.3.3) is that the former has a specific form, which the latter lacks.

5.3.2 Summary

In this thesis, I have given a description of Word Grammar (more properly of **a** Word Grammar), identifying a number of significant properties. WG is a monostratal declarative dependency grammar, where knowledge of language (indeed all of knowledge) is represented in a symbolic network. The elements in the network are concepts, arranged in a default inheritance hierarchy, and relations holding between them, which are arranged in a similar hierarchy. WG lexical structure consists of representations, at varying levels of generality, of the properties of words and other concepts (pronunciations, word-meanings etc)

I have developed the framework in the areas of argument linking, aspect and the treatment of ambiguity, giving accounts in these (and other) areas that exploit the network structures of WG. I explain argument linking in terms of regular symbolic relationships between syntactic and semantic relations (associations), and correspondences between the associations involved in these symbolic relationships and sets of co-occurring grammatical (morphological, syntactic, force-dynamic, thematic etc) properties. I explain aspect in terms of the force-dynamic and thematic properties of the conceptual representations of states and events, and their realisation in syntactic structure. I explain ambiguity in terms of nonmonotonic linkings between levels of representation, and in terms of the exploitation of lexical constructions to extend or coerce the meanings and valencies of other lexical items.

I have presented analyses in this framework of a number of different linguistic phenomena, including the behaviour of various verbs referring to motion events, the distribution of resultative expressions and use of certain verbs in both causative and unaccusative constructions. These analyses have depended on the network structure of WG in that the explanations are given in terms of specific lexical properties of the relevant words and constructions. The kinds of lexical properties that are relevant in the explanations are not limited: morphological, syntactic, force-dynamic and thematic properties are all relevant.

In doing all this, I hope to have provided a clear description of WG and its properties, and to have shown that the assumptions and structures of WG, as presented, provide for a clear and meaningful description of a wide range of grammatical phenomena. In addition to the descriptive success of the framework, I have noted some useful claims that it makes about the learning and representation of linguistic information in the minds of speakers.

At the start (1.1.2) I gave a list of requirements for a properly developed theory of lexical structure; these requirements are satisfied by the WG model in the following ways:

- an account of how the meanings of words are formed, how they relate to each other and how they are learned;

The meanings of words consist of parts of an integrated decompositional conceptual network. A word is directly associated with one (or more) concept in this network and the relationships that it supports define the meaning of the relevant word. Relationships between word meanings are defined similarly by the structure of the network, which is continuous (even outside linguistic semantics). The learning of a word and its meaning consists of the extraction of generalisations over sets of similar tokens.

- an account of how words and their meanings are related, both systematically and idiosyncratically, and how systematic word/meaning relationships are learned and used productively;

The relation between words and their meanings is mediated by the two relationships sense (which is lexical) and referent (which is contextual). The referent is determined by the effects of context (including the lexical structures of other words and constructions) in conventional and less conventional ways.

- a structured theory of syntax and other word/word relationships, including derivation, collocation and agreement, together with an account of how the syntactic and other properties of words are derived from their lexical structures;

The WG theory of syntax has been presented in some detail; it consists of a set of generalisations over dependencies (relationships between words), each having

associated properties. I have discussed derivation relations (1.2.3.1, 5.2.3.4 and, to a lesser extent, both collocation (1.2.4, 1.2.5) and agreement (1.2.2, 1.2.4) relations.

- an account of the relationship between words and their forms, which explains regular variations in form that correspond to regular syntactic or semantic variations; and an account of the relationships that hold among forms.

I have sketched the WG account of the formal properties of words and of inflectional relations (1.2.2, 1.2.4.3). A word has two kinds of form: a base, and a fif (fully inflected form), which are by default the same. The forms are atoms, which are realised in phonemes or written letters. Inflected words inherit from their own lexeme and an inflectional class, which specifies properties of the fif. In suffixation, the base provides the model for the first part of the fif, and the inflectional class determines the form of the second part.

- Finally, if the syntactic properties (or some of them) are to be shown to follow from lexical semantic properties of words, then we require additionally an account of how word meanings are combined in compositional structures, and how the relationships between word meanings are projected onto syntactic structure. To infer a linking rule of this sort, we need a robust syntactic pattern and an equally robust semantic pattern and the two need to be clearly related in a regular and explanatory (motivated) way.

I discuss the linking mechanisms of WG in chapter 3. Syntactic and semantic associative relationships participate in symbolic relationships: syntactic dependencies have meanings, which serve to determine the interpretations of compositional structures, as well as to constrain the possibilities for composition. Just as the (default) properties of syntactic associations are given in terms of a network of related concepts and properties surrounding the dependency class they instantiate, so are the (default) properties of semantic associations. In the sections on compositionality, and on derivation and ambiguity I have looked at some systematic patterns influencing the linking of syntactic concepts and relationships with semantic ones.

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